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Notes and Comments

Scientists and Government

IN the course of his inspiring address on "Science and the Community," recently delivered before a joint meeting of the Manchester chemical societies, Professor Alexander Findlay made some pertinent remarks on the rôle of the scientist in the affairs of the State, with particular reference to the governmental side. In doing so he voiced the sentiments of the majority of his scientific colleagues, for, as he remarked, the demand made by some scientists for a special and, in fact, a supreme position of power in the government of the country is not only unsupported by the general body of men of science but is a product of minds distorted by over-emphasis of the scientific mood. Despite the great service rendered to the community by the scientist, despite his increasing command over the forces of nature, he is usually well aware of his limitations, and only a small minority of his fellow workers are so egotistical as to believe that the scientist is the only wholesome element in society. Even so, this minority has rendered a disservice to the cause of science by making demands, the extravagance, if not the absurdity, of which is recognised not only by their sober-minded colleagues but by the community at large.

As an adviser, an expert witness, or a technician the scientist plays an important part in the work of the Government, but is he, *ipso facto*, qualified to assume the reigns of office at Westminster? In answering this question Professor Findlay stated that, whilst one may expect to find agreement among men of science regarding the laws of science, there is no reason to expect any unanimity among them in the domain of civil legislation. In fact, it is due to lack of unanimity among scientists—certainly among chemists and chemical technologists—that several pressing problems of a purely domestic character are still awaiting solution. As Professor Findlay remarked, some scientists are forgetful of the fact that it is the work of statesmen not so much to control inanimate nature as to adjust the conflicting claims, prejudices, and aspirations of men.

Should Research be Centralised?

CHEMICAL opinion is sharply divided on this question on both sides of the Atlantic, and it is therefore of interest to notice what our American friends think about it. The question forms the subject of the second series of anonymous "debates" on controversial topics in "The Percolator," the organ of the Chemists' Club, New York. On the affirmative side it is urged that research is neither control nor manufacture and therefore it should be segregated. It should be placed where the daily toil and the clamour of things as they are cannot confuse or divert it. It is difficult at any time and under the most favourable conditions to think, plan and relate; and surely it is still more difficult to achieve these when interrupted by insistent demands for time and apparatus for control and additions or subtractions for ever-changing manufacturing processes. Research chemists are, perhaps, rarely artists, but like artists, they need time and quiet; they should therefore be locked up with their tools and their ideas and a reasonable amount of discipline. In many cases the business was there before the chemist and his present activities, and business men are full of what seem to be justifiable complaints about chemists. But the fault lies more with the business man who expects marvels to order for his business, which, at best, is a mixture of tradition, enlightened self-interest, accident and luck.

There are other valid reasons for centralised research. For instance, an idea, whether raw or refined, hurled into a going process that is at least working and providing bread and butter, may disrupt things badly. Rather than tinker with the machine, it is wiser to prove, apart, on an experimental scale and to prove several times and then to plan the change on a working scale. All in the field know what a constant temptation it is to turn a going process into a laboratory bench. Is there a chemical plant that has not found to its cost that a laboratory idea cannot be readily adapted to what is already an active operation? It costs less in the long run to fight the temptation and to permit the plant operator and research chemist each to maintain his proper position.

The Negative Point of View

THOSE who answer the question in the negative ask "Why make such a superior being out of a research chemist? Why pamper him with this expensive aloofness? How will he ever learn to explore unless he is thoroughly familiar with the real presence of things as they are?" Yes, he should be a plumber and a very good one; test tubes are fragile things outside a laboratory. Chemists should be artists, and, as good artists, be able to turn conditions to their needs. They must be students of realities, men and things and the plant is therefore their proper habitation. They must live in it, see it, feel it. If they lose touch, petty differences and rivalries between plant and laboratory will surely arise. One of the curses of American business is that the executive is in one place and the plant somewhere else. Why repeat the mistake with the chemist, at a time when industry is beginning to be disposed to regard the chemist as a necessity? Why provide the plant man with an alibi—what does the research

chemist really know about this? Why provide the centralised research man with his alibi—I did not know that the autoclave had that in it or, where did the manganese get in? Buck-passing under such conditions become necessary. And what of the endless reports and the trips to and from the plant? Says the plant—another report, and to be answered this week; says the laboratory—another brain child in the file.

If the chemist is to be a superior business man and an economist, he must learn how. In these days there is precious little research not intended to be put to practical purposes. It may not be science, but it is sense. Business, with rare exceptions, is not interested in physical constants *per se*. Business wants the best catalyst, and it knows just enough to know that if the catalyst is inhibited by something in a process, then the inhibition or the something must be taken care of. That, business insists, is the chemist's job. Do not, says the business man, let the research man run the plant until he knows how; but, in the meantime, let him learn by contact, not mail, or even teletypewriter.

A New Iron and Steel Fusion

ARRANGEMENTS have been completed between Newton, Chambers and Co., of Thorncliffe Ironworks and collieries, near Sheffield, and the Wellman Smith Owen Engineering Corporation, Ltd., of Darlaston, to consolidate their mutual interests in the iron and steel industries. In accordance with the terms of the agreement, the former company has acquired a share interest in the Darlaston business. In adition, Mr. W. Newton Drew, the chairman and managing director of Newton, Chambers and Co., and two other directors, Lieut.-Col. H. W. Woodall and Sir Samuel Roberts, have joined the Board of the Wellman Smith Owen Engineering Corporation. The operations of the two companies will therefore be very closely associated in the future. Such an arrangement should receive the warm approval of the shareholders of the Darlaston company, who have had a rather disappointing experience during recent years. No dividend has been paid on the issued capital of £255,000 for seven years, and although the company was able to report a profit of £3,017 for 1931, there still remains a debit balance of £516 at profit and loss account. Newton, Chambers and Co., have also suffered through the depressed condition of the heavy industries during the past two or three, but their shareholders have been more fortunate in the matter of a dividend payments. Substantial economies in overhead charges and administrative expenditure should be effected by both companies as a result of the agreement.

Applied X-Ray Research

THE Grasselli Medal of the American Section of the Society of Chemical Industry has been awarded to Professor G. L. Clark, of the University of Illinois. This award has been made for Professor Clark's work on X-ray research as applied to chemical problems, and more specifically, for the papers presented on that subject.

The principal developments in X-ray science have evolved around the diffraction of X-rays by materials, each in its own characteristic fashion, so that an interpretation of diffraction patterns led to a knowledge of the ultimate structure of these materials. Another branch of the science in which a great progress has been made is radiographic examination, especially for detecting in homogeneities in metal structures. The practical benefits of this type of examination have been exemplified in the perfect performance of units subjected to extreme conditions and in the perfection of technique in casting, welding and other industrial operations.

Specific examples of applied X-ray were outlined by Professor Clark to indicate the range of research achievement and future possibilities in this field. These studies include detailed analysis of all variables on the structure and properties of rolled sheet steel; fatigue problems in steel rails; the effects of measured mechanical strain on commercial steel specimens; and problems in the annealing of low carbon sheet steel, silicon steel, copper and brass. In addition there is the mechanism of corrosion in alloys from a study of the corroded surfaces; the inorganic crystalline chemistry of storage batteries; the chemical reactions and opacifying agents in enamels; the classification of chromite ores; grain size measurements from X-ray data in colloidal and microscopic ranges; constitution and classification of paraffin wares; changes in the breakdown of insulating materials in high tension cables; molecular orientation on the surfaces of drops; studies of the skin structure and superficial chemical effects on glass; the relationship between structure, manufacturing processes and properties of cat-gut; and the structure of proteins. From this recital of subjects it will be seen that the possibilities of X-ray examination are far-reaching.

The Australian Market

UNITED KINGDOM exports to Australia for the five years ended June, 1929, averaged £64,560,000 per year. Only India, with a population forty times that of Australia, bought larger quantities of British goods. This statement should induce any British manufacturer or exporter to read a booklet* which has been compiled in Australia by the Federal Council of the Australian Association of British Manufacturers. This booklet is offered for the guidance of British manufacturers in forming their post-Ottawa policies. So far as the chemical industry is concerned imports of dyes show a decline, as between 1929-30 and 1930-1, from £152,285 to £122,257. Britain's share fell from 75 per cent. to 65 per cent., both Germany and Switzerland increasing the actual value of their trade. Possibly this position may have been improved since by the depreciation of sterling, but it suggests that close attention is needed to foreign competition particularly in the event of the demand becoming more normal and enabling an expansion in total imports. Imports of drugs and medicinal preparations show a substantial decline which is probably due in part to the tariff. About half of the imports are admitted duty-free from Britain, or at a 10 per cent. duty only, if from foreign countries. The balance is subject to duties ranging up to 50 per cent. *ad valorem* and higher, in the case of fixed rate duties on lines in competition with Australian products.

* THE AUSTRALIAN MARKET. By The Australian Association of British Manufacturers. With a Foreword by Sir Arthur Balfour. London: P. S. King and Son, Ltd. Pp. 38. Price 1s.

The Institutes of Chemistry—III

By Professor H. E. ARMSTRONG

COMPARING the product of the schools with that of the publishing societies—not the Chemical variety alone but the Royal also and many others—there is an interesting agreement. The two are necessarily in reciprocal relationship. In most schools the students are taught by rote—their's not to reason why, their's but to do or die in the University examination race. Everything depends upon the trainer. Really, the race, as conducted to-day, is a competition between trainers and racing authority. I have often said Cambridge is an appanage of Newmarket. Aga Khans abound who buy boys of promising pace with scholarships. No thought is given to the ultimate effect upon the poor race-horse. What the schools of every grade and their patrons ask for is winners, wherewith they can advertise. Put more blankly, the whole business is one of bold advertisement and the encouragement of a spirit of vainglory. Being a sporting nation, we encourage the game. No other nation is so far debased by the worship as we are. The so-called research of the schools is brought in to gild the gingerbread—for the most part it is but tinsel, because the foundation upon which it is laid is unreal—it peels off on leaving college.

Rewards for Research

Rewards galore are given for "research"—in value often in inverse proportion to the public service rendered. The excuse made is "new knowledge," that, too, without reference to its intrinsic value. Meanwhile, vast accumulations of knowledge are left rotting. Good teaching meets with no special reward; no one thinks of encouraging the teacher; no one thinks of the need of training him to run straight and at a steady pace. Headmasters have little care for educational method; universities take no count of their own work as universities.

At present there is no morality in the whole business. We treat life as a game and do not realise that success, even in games, is achieved only by hard training. If we trained our heads as we train our hands and feet, for all games, there would be something in them.

We are falling behind in doing business in competition with other nations. My own limited observation would lead me to think that this is due, in no slight degree, to our relative inefficiency as commercial travellers—to lack of intelligence, enthusiasm and individuality. The average business man is a sorry spectacle when his mental equipment is taken to pieces. Study the course of training in any secondary school; it is impossible to believe that men can be made by such training. The talk is ever of character—but what sort of character? No thought is given to the cultivation of a desire to learn and to use knowledge effectively. Our inefficient teaching of modern languages is a disgrace to us. Even the will to work is not there—this is the complaint recently voiced in "The Times" by the late City Recorder, Sir Henry Dickens, in discussing crime. Those who come out best, more often than not, are those who have made no show at school; those who resent learning the senseless matter put before them.

Reform the Schools

It rests with industry to demand the reform of the schools—the substitution for the present race of literary head masters of men with real breadth of outlook, able in some manner to feel the pulse of the times. Industry itself is greatly behind, because of the general technical inefficiency of management. Complaint is rife to-day that whilst money is there, people are not supporting industrial enterprise. It is largely because they have no confidence that it will be wisely spent. They are all but forced to support unproductive expenditure in the shape of Government loans.

Let us go back to our sheep that are so led astray, the publishing societies—our Chemical Society in particular. We may classify the so-called research work of the day under three heads:—(1) Original work by competent workers; (2) Beilsteining; and (3) Pottering. A far too large proportion of the work brought under the notice of the society is Beilsteining pure and simple. Additional exercises are being worked out in illustration of well-known rules. Much of the research work done to-day, of this order, is work we were doing forty or fifty years ago, stated in terms of a new jargon illustrated with meaningless bent arrows: of leaning protons, chain reactions, semi-permeable double bonds, polar this and that, affording no further solution of the problems at issue and often so loosely worked out that there is little, if anything, worth putting on record as new knowledge. Conclusions are even based upon a few mixed melting points and scarcely a substance is properly described. Often, the work does not stand repetition Yet because of a farrago of speculative nonsense, falsely dubbed theory, it is too often put on record at length.

Use the English Language

The modern student simply does not know the meaning of the language used by the makers of chemistry—he is only schooled in the mystic language of the later spoilers. Hydrogen, acid, solid, liquid, gas, are words of no tangible meaning to him. He is taught in terms of phrases and his own phase is one bordering on lunacy; as a result, he is confined to a self-created asylum, over the walls of which the public have no desire to look. No one is more hoist with his own petard of conceit. What English chemists most need to-day is to recover the use of the English language; all who give grants should make this an absolute condition of their gifts.

We have to make up our mind what is worth putting on record. The practice which has too long prevailed of publishing students' work in Ph.D. form must come to an end. There is much talk of encouraging the young man—in other words, of advertising him. This, of course, is in part done to overcome the modern parent's unwillingness to spend his money on his son's higher education, although he has no objection to this being done at the expense of the ratepayer; in part, to retain the services of the student as assistant.

Although he was a conceited young puppy at the time, there was an element of truth underlying van't Hoff's mutiny against Kekulê:—

"Eine dritte wichtige Sache ist ein kleines Zerwürfniss mit Professor Kekulé; er hatte neue Gedanken über Campher, Terpentin usw. und will einige Laboranten benutzen, die Sache zu bearbeiten, d.h.er will einige zahlende Laboranten in unbesoldiete Privatassistenten verwandeln. Ich habe deshalb nicht angebissen und war also genöthigt, ein eigenes Thema zur Bearbeitung zu suchen, und nun ich damit beschaftigt bin, ist Professor Kekulé nicht mehr, wie er vorher war und lockt andere heran. Schon jetzt hat er drei gefangen."

Moral Training

What the student needs is not encouragement, so-called, let alone advertisement; he most sorely needs moral training, to be made aware of the depth of his unfathomable ignorance; to be without conceit; ever to have the bare truth before him. I can never forget being pulled up by one of the honorary secretaries of our City and Guilds Institute when I made some unconsidered reference to research work: "Your business is to teach boys, not to do research." He was right from his point of view. We are not sufficiently mindful of our prime duty to be teachers.

The system we have developed has crashed beyond recovery, because of its cost; because of the burden it imposes upon bookshelves, especially because no one wants and no one reads most of the matter that is published. A reviewer of current literature recently pointed out that soon the author would be the only reader and critic of his book This stage has already been reached in our field. Abstracts have killed reading. I have long thought that the Chemical Society did ill service to our science in producing the "Abstracts," which at first won for it so much glory. As indices they are invaluable, educationally they are a curse to us—they encourage dictionary worship and sterilise thought, only promoting tit-bittery in reading. As papers are only read in abstract, we may as well publish most of them as abstracts, practically in a form ready for entry in Beilstein. Take the first paper

on the slip for the first meeting of the Chemical Society this Session:—

> The Stereochemistry of 2:2′-Disubstituted Diphenyls. Part II. The Optical Resolution of Diphenyl-2:2′-disulphonic acid. [M. S. Leslie and E. E. Turner.] In accordance with anticipation (Part I, J., 1932, 2021), diphenyl-2:2′-disulphonic acid is capable of being resolved.

Now that it is proved that diphenyl can give optically active derivatives, further addition to the list, unless they show some special feature, are only of Beilstein value. The title should have been divested of all high-fallutin' flummery and reduced to "Optically active Diphenyl-2:2′-disulphonic acid." The words, "is capable of being resolved," should be reduced to "has been resolved," by means of salt X, etc. A statement of the characteristics of the acid is then all that need be added. At most half a page should be given to such work.

Fit Matter for Inquiry

We have further to decide what is fit matter for students' inquiries, especially in the physical field. Unfortunately, the curse of unnecessary subdivision is upon us and teachers are under the impression that they must justify themselves by fairly regular advertisements. The Society publishes a vast amount of what some of us irreverently call "Lowry stuff." Alkaloid after alkaloid is tortured in the polariscope; long tables of values and curves are then set out. Who cares a rap for such work? It may have a value some day, if and when it can be interpreted; the Society should therefore arrange a way of collecting such data—but need they be published at any length? Would not the curves suffice? Is such work research work? Would it not be better for the student to learn to use the instrument, in as many days as he spends months in carrying out his task, then go on to some other tool? I suspect the Ph.D. lurks in the background. This is the cause of much redundant publication to-day. The student ought to get over the stile alone—why should the professor appear as climbing with him or his thesis be published at public expense?

Another set of sinners belong to the surface school. They, too, hunt in couples but the work is usually done by the junior, who is a raw student. As success in such work depends upon the most minute precautions being taken and only the experienced worker can be trusted, not a few of us view the results with suspicion and feel little confidence in the arguments based upon them. To me, the catalytic field seems full of wreckage of the "unripe fruit" which Kekulé so stigmatised. The Walden inversion is an old chestnut that is always turning up afresh. We can well do without further examples. A full study of the intimate conditions underlying the change is long overdue. Obviously no tyro can do such work.

Then surely it were time that the account of three carbon tantology were closed and balanced—some meaning put into the maze of unintelligibility it presents. A door is either closed or open. A hinge necessarily works two ways—does it help us to multiply the proof when there is so much necessary and useful work to be done? Has not angle worship had its day—has it any justification in fact? There is not much of the angelic about it.

Then there is endless, redundant, soul-sterilising work on solution equilibria and the condition called solid-solution—a most misleading misnomer, thoughtlessly introduced by one of our Teutonic gods, whose every word has been taken as law by the uncritical. Too much of the physical work is dangerously near "pottering"; at best, it is the equivalent of finger printing and photography, a mechanical exercise which any properly instructed laboratory worker should be able to carry out when the information is needed in practice. We forget that to be worthy of the title, the chemist must be a laboratory artist, not a mere bricklayer. At times, like Mr Winston Churchill, he may indulge in a brick-laying spell—really the work is "labourer's" not an artist's.

Training in Criticism

One of the greatest mistakes made by the Chemical Society has been its discouragement of broad theoretical discussion. Little is done to draw out the critical faculty. Apart from the atomic theory, there is no sound theory underlying most of our work. We are more and more descending to fanciful speculation, largely metaphysical. In fact, we are becoming a priesthood, not worshippers of truth. Used properly, the mighty engine of research is of infinite value; prostituted in the manner it too often is to-day, it may well be our undoing. Behind all scientific advance is the art of discovery but this, more often than not, is exercised unconsciously. Few teachers are yet versed in its rules. It has to be codified and applied to all teaching, from youth upwards. Only when this is done will the advanced student be able to step naturally into the field of original inquiry, without any special year of preparation. He will be a competent worker and will honour his teacher. Can he to-day?

Safety Glass Manufacture

Promising New Raw Material

NON-SPLINTERABLE glass consists essentially of a very thin sheet of celluloid or similar flexible material firmly sandwiched between two sheets of ordinary glass. Cellulose acetate and other cellulose esters have naturally been put forward for the same purpose, while the growth of the synthetic resin industry has rendered feasible the application of many novel materials to safety glass manufacture. Some of the latter merit attention in view of their freedom from the darkening tendencies manifested by the intermediate layer of nitro-cellulose, although it is worth while pointing out that recent improvements in nitro-cellulose plasticisation have gone a long way towards eliminating this particular defect.

According to Dr. H. Schmidt ("Metallbörse," October 26, 1932, page 1373) synthetic resin intermediate layers in the usual design of safety glass are produced by application to the glass surfaces in the liquid form or in solution, the sandwich then being warmed to drive off solvent and the three layers finally brought into the closest possible contact by more intense heating under hydraulic pressure. A solution of phenol-formaldehyde resin in alcohol or acetone, for example, is applied to the well-polished glass surfaces at 30° to 40° C.; solvent is driven off at 80° C. and the sheet of safety glass consolidated by heating for several days at 150° C. under a pressure of 5 atmospheres.

Resistance to Active Reaction

The very pronounced darkening which occurred on exposing the earlier phenol-formaldehyde resins to sunlight has been largely eliminated of recent years, but as the urea-formaldehyde condensates are entirely free from this defect, the latter are preferable on this score from the safety glass standpoint. The price factor also renders them attractive and it is rather interesting to note that their good adhesion and non-darkening tendency may enable safety glass to be produced consisting solely of a layer of urea-formaldehyde resin in contact with a single glass sheet. It may also be recalled that sheets of urea-formaldehyde resin were introduced some years ago as concussion-proof glass on battleships. On the roads, however, the pitting effect of dust and sand, would probably lead to rapid deterioration of the surface in the absence of a protective glass layer. Excellent resistance to actinic action is also a feature of the toluol sulphonamide-formaldehyde condensation products which may be used in the intermediate layer either in themselves or in conjunction with nitro-cellulose. A suitable coating solution contains 25 parts low viscosity nitro-cellulose, 50 parts para-toluol sulphonamide resin and 125 parts acetone. Other non-darkening and highly adhesive condensation products which have been put forward in the safety glass field include phenol-furfural, aniline-furfural, glycerol-phthalic acid and glycol-phthalic acid.

Certain resins obtained by the polymerisation of individual substances—as distinct from the condensation products discussed above—also represent promising raw materials for safety glass manufacture. Included among these are polystyrol, polyvinyl acetate, and aliphatic esters of itaconic acid, crotonic acid, acrylic acid and cinnamic acid. Some of the latter are superior to cellulose derivatives in respect of non-splintering qualities, although practical exploitation is hindered by economic considerations. Polystyrol and aliphatic esters of polvinyl alcohol, however, are relatively cheap, and possess superlative mechanical and physical characteristics.

The Disposal of Refuse

By E. W. SMITH, D.Sc., F.I.C.

The economic disposal of refuse is now regarded as a matter of extreme importance in large industrial areas. The requirements of the ideal destructor were outlined in a paper read before the Institute of Fuel on November 9, from which the following extracts are taken.

EVERY organised community is under the obligation of collecting and disposing of domestic and trade refuse. When it is realised that the total quantity of the combined house and trade refuse to be dealt with in England amounts to 12,000,000 tons per year, and that in the Metropolitan boroughs of London, with a population of about four millions, the total refuse amounts to about 1,200,000 tons per year, it will be conceded that the magnitude of the problem is of no mean order. On the average, every inhabitant in this country is responsible for the production of approximately a quarter of a ton of refuse per annum. The cost of public cleansing in London exceeds £2,000,000 per annum, of which refuse collection and disposal accounts for £1,100,000.

The Composition of Refuse

The composition of refuse is very variable. If constituents of a casual nature be left out of account, the components of the refuse may be animal (fish and meat offal, bones, leather, rags, etc); vegetable (paper, cardboard, cotton rags, potato peelings, cabbage stalks and other waste vegetable matter, wood, string, charred wood, etc.); or mineral (coal, coke, and partly burnt cinders, much being in the form of dust, metal, brickbats, glass, pottery, and clinker). The relative proportions of these various constituents depend on the season, on the locality, and on the standard of living of the inhabitants. In the summer, fuel and fuel residues occupy a relatively unimportant position compared with animal and vegetable *débris*. In colliery districts, where extreme economy in the utilisation of fuel is generally not practised, a large proportion of partly unconsumed coal and coke is to be found, whereas in districts in which thrift is necessary any coal residues present will consist mainly of ash and clinker. In agricultural districts, high proportions of vegetable matter are present. In large towns the composition of the refuse will vary widely in different districts, thus in shopping centres there will be a preponderance of paper and cardboard, in the neighbourhood of markets much vegetable *débris*, in poorer districts much metal derived from tinned foods.

The moisture content of refuse also varies between wide limits, ranging in this country from 10 to 40 per cent., though in continental and oriental towns in which methods of sanitation are very primitive or where but little solid fuel is employed, or where, for example, bananas may be the staple diet, moisture contents may exceed 80 per cent. A large proportion of the moisture present in refuse is contained in the vegetable constituents. This is not surprising in view of the fact that potatoes and cabbages contain respectively 75 per cent. and 90 per cent. of moisture.

Calorific Value of Refuse

In general, in this country, the calorific value of refuse is rather higher in winter than in summer. In southern towns and in agricultural districts the net calorific values in summer and winter are of the order of 3,000 and 4,000 B.Th.U. per lb. respectively, whereas in the neighbourhood of the coalfields the corresponding figures may reach 4,000 and 5,000 B.Th.U. per lb. or more. The following table shows the calorific value and moisture content of a few typical constituents of refuse as rejected. In the mixed refuse, equalisation of the moisture content will, to a certain extent, occur:—

Constituent.	Moisture. per cent.	Ash. per cent.	B.Th.U./lb. net basis. Gross.	Net.
Paper	15	15	5,200	4,600
Wood	20	0.5	6,000	5,300
Potato peelings ...	75	1	1,800	850
Cabbage waste ...	90	0.5	700	—300
Meat offal	60	1	4,000	3,000
Coal	5	8	12,500	12,100
Cinders	0	50	7,200	7,000
Dust	20	65	1,600	1,300

With increasing moisture contents the net calorific value of wet refuse of a given composition (on the dry basis) falls off more rapidly than the content of dry matter decreases, due to the heat required for the evaporation of the water. This is illustrated in the following table for a refuse of net calorific value (dry basis) 3,000 B.Th.U. per lb.

Moisture Content of Refuse.	B.Th.U./lb.	Percentage Reduction in net Cal. Value.
0	3,000	—
10	2,595	13.5
20	2,190	27
30	1,785	40.5
40	1,380	54
50	975	67.5
60	570	81
70	165	94.5

Refuse has a very low nitrogen content, and cannot therefore do much to fill the nitrogen needs of crops. In pulverised form, however, it is of use in helping to increase the moisture-retaining powers of the soil.

Alternative Method of Disposal

Many methods have been adopted for the disposal of refuse. The most usual is that of the "dump," where enormous quantities of refuse are often dumped crude with little or no attempt to render it innocuous. Another method employed is that of tipping the refuse into the sea. To this there are obvious objections owing to the frequent return of much of the material to the beaches and foreshores in the vicinity. A third method is that of pulverisation for manurial purposes, but refuse has practically no nitrogen value, its chief value being in lightening the soil and the supply of humus. A fourth method is that of incineration as a whole in destructors. A fifth method consists in the complete separation of the refuse for salvage purposes. This is partly done by hand, and partly by mechanical means, with the object of disposing by sale of everything of market value, such as paper, tins and metal, rags, bottles, broken pottery, etc., the residue being dumped on the land. Still another method is that of controlled tipping, in which the refuse is placed evenly along the ground and soil spread over the refuse to a sufficient depth to ensure that the refuse shall be innocuous.

Utilisation of Heat Value

The latent possibilities in the heat value of refuse have been appreciated for some time. There are many plants in the country used for the complete incineration of refuse in which the hot waste gases are employed for raising steam. The limiting factor, however, has been the inability of such plants to give a constant supply of steam at the required pressure of sufficient reliability to enable large steam operations to be carried on with certainty. In other words, the value of the steam is of secondary importance, the disposal value of the system being of primary importance. Refuse varies so enormously in its composition from district to district, and from season to season, that it is no wonder that it is only recently that entirely satisfactory steam plants have been possible. Many problems have had to be solved, but it can with confidence be stated that both on the Continent and in this country plants are now in operation which are capable of dealing with refuse and producing steam under as constant conditions as are found with any other method of steam generation.

One of such plants is about to be erected by the Ford Motor Co., at Dagenham. This is similar in design to that which has been working for some time at Huddersfield. To be successful such a plant must give a constant output of steam at any required pressure; it must give a maximum steam production per pound of refuse burnt; and it must have the greatest degree of mechanisation of refuse handling.

In plants of the Huddersfield type, the incinerating units comprise one or more cells of the high pressure blast furnace type working in conjunction with a water tube boiler. The collecting vehicles tip their contents into a storage hopper situated below ground level. By means of a grab operated

from an overhead electrically driven mono-rail telpher, the refuse is conveyed to a rotary distributor. The function of this unit is to ensure an even and open flow of refuse through a magnetic zone. At the discharge end of the distributor a horseshoe type magnetic separator extracts tins and ferrous metals, the bulk of the refuse being carried forward on a slow running picking belt to an auxiliary storage pit. Ferrous metals from the magnetic separator and non-ferrous metals from the picking belt are delivered separately to the floor alongside the two metal baling presses which are hydraulically operated. From the auxiliary storage pit the refuse is transferred by means of a second grab and telpher to large overhead steel storage hoppers, from which the incinerator cells are fed. The two telpher units are interchangeable. From the overhead hoppers the refuse is fed by hydraulically operated rams direct into the incinerator cells. Man handling of the refuse is thus practically eliminated. Due to the fact that the main refuse hoppers are cleared during each period of 24 hours, there is no chance of the refuse becoming offensive through standing.

The Steam Raising Plant

The steam raising plant consists of four water tube boilers, four-drum type, fitted with superheaters and working at 200 lb. pressure. Each boiler unit is arranged to work in conjunction with two refuse cells. These cells are of the water-jacketed vertical shaft type. The feed water system is so arranged that the water jackets of the cells form part of the boiler circulating system. The refuse is burnt at high temperatures in these cells by high pressure pre-heated air introduced radially through equally spaced tuyere tubes arranged at the lower part of the water-jacketed furnace. The products of combustion after leaving the throat of the furnace pass through a refractory lined combustion chamber at a temperature of 1,000° to 1,100° C., and thence forward between the tubes of the boiler. To ensure complete combustion preheated air is admitted near the entrance of the combustion chamber. Waste gases from the air heater are ejected to the chimneys by means of dust-arresting waste gas fans. The non-combustible portion of the refuse is converted into a hard vitreous and innocuous clinker in the lower section of the furnace, and periodically this clinker is cut off by means of a hydraulically operated steel knife which on completion of its cutting stroke isolates the furnace, enabling the cut clinker to be removed through a bottom door which is also operated hydraulically. The clinker is discharged, quenched and crushed and screened into grades for use as road-making material.

Percentage Heat Recovery

Steam from the boiler plant is drawn direct into the mains of the adjoining corporation power station, the output being remarkably steady and consistent. The plant is in operation 24 hours to the day, and during the 12 months ending March 31, 1932, the total refuse disposed of was 26,916 tons. The equivalent amount of coal saved to the electricity supply department was approximately 8,000 tons. On test, the gross heat balance of this destructor plant was found to be as follows:—

	Per cent.
Recovered in the form of steam	64
Loss in waste gases	18
Loss in unburnt material	7
Loss in radiation and convection	11

Another system which has met with a considerable amount of success on the Continent is that known as the Volund system, tried out at Gjentofte, Denmark. This system is peculiarly suitable for very large installations. It is capable of producing under hygienic conditions, with a recovery of over 60 per cent. of the heat, a steady output of steam at any desired pressure and constant superheat temperature.

Considerations for the Ideal Destructor

Refuse, broadly speaking, is a solid fuel of low calorific value, high moisture content, and heterogeneous and widely varying composition with a high proportion of incombustible matter. It is a proved principle that greater efficiency is obtained in the combustion of all solid fuels if they are charged continuously, as by means of a chain grate stoker, than is obtained by charging intermittently in comparatively large amounts. Where boiler furnaces are hand charged this principle is often considered to be so important that the stokers are paid special bonuses for strict adherence to a schedule of charging in small amounts at frequent and regular intervals. The low calorific value of refuse makes this principle even more essential than in the case of coal or coke, and the ideal destructor should therefore be charged by a method as nearly continuous as possible. As a corollary the discharge of non-combustible residues should be continuous, or at any rate, frequent.

The more or less high and constantly varying percentage of moisture contained in the refuse means that if the fuel is charged directly into the combustion zone of the incinerator, the expenditure of heat in driving off this moisture slows down the whole combustion process, lowers its temperature, and makes combustion less complete and resulting conditions unstable. A destructor should therefore provide for pre-drying the refuse, wholly or partly, and must provide simple and effective control over heating and throughput conditions at this stage.

Refuse, however, is heterogeneous both as to size and as to intrinsic combustibility. Small and large particles of carbonaceous matter are inextricably mixed up with more or less large particles of non-combustible materials. The combustible materials vary greatly in their reactivity to combustion, due to varying mass, density, moisture content and composition. A destructor, in consequence, should be so designed that the various stages of the process are timed to ensure that the densest carbon particles are subjected to burning conditions best suited to their complete combustion. It should be flexible and capable of easy and immediate regulation as regards rate of throughput and burning conditions, to ensure consistent volume and temperature of combustion gases

Deposition of Dust

A large proportion of refuse consists of dust, combustible or non-combustible; if the destructor satisfies the conditions outlined above, the great bulk of this dust will either be burnt or converted into fused clinker with the other incombustible residues. A certain proportion, however, is bound to be entrained in the hot combustion gases, and the destructor design should ensure that this dust is effectively deposited and removed, and contains as low a proportion of carbonaceous material as possible. It should be so constructed that no possibility occurs of air infiltration at charging, clinker extraction or during the transit of the refuse through the furnace or the passage of the combustion gases from the combustion zone to the chimney. It should also be readily adaptable for the regular intermixing of solid fuel with the refuse, or the provision of auxiliary liquid fuel burners for enriching the combustion gases.

The process of handling refuse on the disposal plant, and the processes of charging and discharging the destructor should be as clean as possible both from the point of view of labour conditions, and from the point of view of the amenities of the district in which the destructor plant is situated. Finally there are the general considerations which apply to any industrial plant. Economical refuse destruction demands a plant having low capital cost per unit of throughput; low labour and operation costs; low cost for maintenance and repairs; high throughput per unit of ground space occupied; and robust design to meet the drastic conditions inevitable with such a crude fuel.

Fertiliser Trade in Canada

Fewer Brands Registered

THE Fertiliser Division of the Dominion Seed Branch, Canada, reports that fewer brands of fertiliser are being registered this autumn than for several years past. This may be attributed to the general slump in trade, but not altogether. In recent years fertiliser authorities in the different provinces have been co-operating with the manufacturers with a view to reducing the number of formulæ among fertilisers offered the farmers. It is agreed that a range of formulæ, comprising not more than six or eight different mixtures, is about all that is needed for general crop requirements in most of the Canadian provinces. As manufacturers are required to manufacture fewer formulæ, but increased volume of each of the formulæ retained, their cost of production will decrease, and farmers will be able to buy fertilisers at lower prices.

The Work of the Government Laboratory

Enforcing the Requirements of Acts and Orders

THE report of the Government Chemist upon the work of the Government Laboratory for the year ending March 31, 1932 (H.M. Stationery Office. price 9d.), like its predecessors, contains many points of general chemical interest, but it is to be regretted that the report is too strictly "official" in the manner of dealing with the variety of subjects included. A little greater detail of difficulties presented and means adopted in overcoming such difficulties, and of the tests adopted to meet specific investigations, would do much to relieve the monotony of perusing the statistics which are recorded.

The chemical work performed wholly or in part in the Government Laboratories covers the Admiralty, Ministry of Agriculture and Fisheries, Department of Agriculture for Scotland, Air Ministry, Colonial Office, Board of Customs and Excise, Fishery Board of Scotland, Ministry of Health, Board of Inland Revenue, Ministry of Pensions, Post Office, Department of Scientific and Industrial Research, Scottish Department of Health, Home Office, Board of Trade, War Office, Privy Council and Office of Works. The laboratory also renders "reserved services" to the Government of Northern Ireland in respect of dutiable goods, and performs certain services for the High Commissioner for India, the Crown Agents for the Colonies, the Dominions Office, the Corporation of Trinity House, the Commonwealth of Australia and the High Commissioner for Southern Rhodesia, on a repayment basis. The total number of samples examined in the course of the year including those dealt with at the chemical stations, was 473,055, as compared with 517,462 in the preceding year, a decrease of 44,407.

Sheep Dips

The Sheep Scab Orders issued by the Ministry of Agriculture require the periodical dipping of sheep in a bath prepared from a dip which has received the approval of the Ministry. In applying for the approval of a dip, the manufacturer submits a sample, together with the formula according to which the dip has been prepared, and both formula and dip are forwarded to the Government Laboratory. From time to time the formula proposed shows that the dip made as described, or the bath prepared at the dilution suggested, would not contain a sufficient quantity of active ingredient (arsenic, tar acids, nicotine, or sulphur) to be considered effective against sheep scab. In such cases the formula is returned to the makers for amendment. Where the formula is satisfactory, the dip is analysed to ascertain whether it has been made according to the formula. Samples of the dips as sold for use, as well as samples from the bath in use during the dipping operation, are also occasionally examined to ensure that dip and bath are of the approved strength. Fifty-six samples were submitted during the year and 17 were reported as defective.

Fertilisers and Feeding Stuffs

The Fertilisers and Feeding Stuffs Act, 1926, makes a clear distinction between civil claims and criminal prosecutions. In some of the offences against the Act, the consent of the Ministry and analysis of a sample by this laboratory are required before proceedings can be taken. Samples taken at a farm are now the basis of civil claims only, and a sample may be submitted to this department in these cases at the instance of either the buyer or seller of the article sampled, who objects to the certificate of the agricultural analyst. The 1926 Act names the Government chemist as the person by whom the analysis shall be made before consent for proceedings is given, or to whom reference shall be made in disputed cases. During the year, 8 fertilisers and 7 feeding stuffs were examined, 3 samples being received from sellers. Of the fertilisers 5 were mixed fertilisers, 2 were sulphate of ammonia, and 1 was superphosphate. Two of the mixed fertilisers contained less than one-fifth and another less than one-third of the declared amount of potash, together with deficiencies of other ingredients.

Under the provision of the Dangerous Drugs Act, 1920-1925, the importation or exportation of prepared opium (that is, opium prepared for smoking purposes), the resin of Indian hemp (known also as hashish or charas) and benzoyl-morphine, are prohibited absolutely. The Acts further make it an offence, *inter alia*, to import or export, except under licence and into or from ports approved by the Commissioners of Customs and Excise, raw opium, Indian hemp and coca leaves. The importation or exportation except under licence of the following drugs is also prohibited: morphine, cocaine and ecgonine, and any preparation containing not less than one-fifth of 1 per cent. of morphine or one-tenth of 1 per cent. of cocaine or ecgonine; esters of morphine, diamorphine (heroin), dihydro-oxycodeinone, dihydrocodeinone and dihydromorphinone, and any preparation containing any proportion of any of these substances; medicinal opium; and any extract or tincture of Indian hemp. Methods for the identification of some of the drugs of addiction more recently added to the list have been described by J. King ("Analyst," 1931, *56*, 498). In suspected cases the officers of Customs and Excise sample the goods and the samples are examined here; 23 samples were received and were found to be free from "dangerous drugs."

Seventy-one samples of imported coloured goods were examined to ascertain whether they contained synthetic organic dyes, the importation of which under the Dyestuffs (Import Regulation) Act, 1920, is prohibited except under licence.

Hydrocarbon Oils Duty

By the Finance Act, 1928, a Customs duty of 4d. per gallon was placed on all imported hydrocarbon oils, but a rebate from the duties was allowed on the delivery for home consumption of any oils other than light oils. This duty was increased to 6d. per gallon by the Finance Act, 1931, and again to 8d. per gallon by the Finance (No. 2) Act, 1931. The duty is in effect payable only in respect of motor spirit, white spirit, turpentine and other "light hydrocarbon oils." It is leviable upon light oils imported as such or produced in bonded refineries from imported oil, and also upon light oils contained in imported composite articles such as enamels, paints, varnishes, lacquers, road dressings, and special solvent materials. A drawback equal to the amount of duty paid is allowed on exportation of any hydrocarbon oils or of any article in which there is contained any hydrocarbon oil used as an ingredient in its manufacture. The meaning of the expression "light oils" for the purposes of the duty is given in the Act as "hydrocarbon oils of which not less than 50 per cent. by volume distills at a temperature not exceeding 185° C., or of which not less than 95 per cent. by volume distills at a temperature not exceeding 240° C., or which gives off an inflammable vapour at a temperature of less than 22.8° C. when tested in the manner prescribed by the Acts relating to petroleum."

In the administration of this duty, it has been necessary to examine a large number of samples of imported goods to determine the duty payable, and of exported goods to check the declarations of traders making claims for repayment of duty on account of duty-paid oils used as ingredients in the manufacture or preparation of the goods in question. The total number of samples examined was 10,031, of which 7,807 were from imported, and 2,224 from exported goods. Of these 6,217 consisted of hydrocarbon oils and 3,814 were miscellaneous composite goods, such as enamels, lacquers, leather colours, paints, varnishes, garage preparations, road dressings, solvents, insecticides, medicinal and toilet preparations, essential oils, etc.

Safeguarding of Industries Act

This Act came into operation on October 1, 1921, and from that date a large number of samples, many thousands a year, has been examined at the laboratory as to liability of the goods to Key Industry Duty. The particular part of the Act (Part I.) dealing with this duty has been continued with some amendments by the Finance Act, 1926, for a further period of ten years. When the Act came into force the Board of Trade drew up a list of the individual substances liable to duty. This list was extended by an additional list, operative from

January 15, 1927, and it includes a number of general headings for groups of dutiable substances which are not as a rule specified individually. During the past year, 11,882 samples were examined in addition to 71 samples which were examined both for dyes and liability to Key Industry Duty. The object of the examination in most cases was to ascertain (*a*) whether the chemical was such as to come within the class of those liable to duty; or (*b*) whether, in the case of substances bearing trade names without indication as to their ingredients, such as medical preparations, the imported article contained any substance liable to duty, and, if so, in what proportion.

Over 700 samples of wood naphtha, including other crude methyl alcohol and mineral naphtha and 158 samples of pyridine and dyes intended for use in the manufacture of methylated spirits were examined. Except in one instance, the materials represented by the samples were approved as fit for methylating purposes. For the purpose of controlling methylated spirits or spirits other than methylated spirits used free of duty in connection with manufacturing operations, 2,327 samples of special denaturants, specially denatured alcohol, recovered spirits, residues from stills and articles manufactured with industrial methylated spirits were examined.

Methyl Alcohol and Fusel Oil

Wood spirit (methyl alcohol) is not liable to spirit duty on importation unless purified so as to be potable, in which case it is dutiable as ordinary spirits. Of 103 samples of methyl alcohol, 18 were found liable to duty on the grounds of potability.

Fusel oil which consists largely of propyl, butyl and amyl alcohols, is a by-product in the manufacture of ethyl alcohol and is of considerable commercial importance as a constituent of lacquers, varnishes, etc. Whether imported or home produced, it generally contains ethyl alcohol as an impurity, but duty is not charged on such ethyl alcohol unless upwards of 15 per cent. of proof spirit is present. This was the case in 10 of the 279 samples of imported fusel oil submitted for examination. As an alternative to payment of duty, the importers were allowed by the Board of Customs and Excise to treat the fusel oil so as to reduce the proportion of proof spirit to the limit of 15 per cent. Fifty-one samples of fusel oil from British distilleries were examined. Of these, three were found to contain more than 15 per cent. of proof spirit.

Glucose, molasses, saccharin and other sweetening agents, as well as articles containing them, are examined to determine their rate of duty. Glucose is largely used for brewing purposes and in confectionery; molasses enters into the composition of cattle foods, sauces, and dyewood extracts, and is employed in the manufacture of spirits. The synthetic sweetening material saccharin is frequently substituted for sugar in the manufacture of table waters and in the preparation of foods for diabetic persons.

Preparations containing Sugar

The variety of preparations containing sugar is so great that it has been found necessary to adopt fixed rates of duty in the case of those which are regularly imported and fixed rates of drawback for exported preparations, samples being examined only in cases of doubt as to their description or rating for duty purposes, and occasionally as a check on the fixed rate. There are, however, many articles for which it is not practicable to fix a special rate of duty, and these have, consequently, to be tested on each importation, or where repayment of duty is claimed. Among the articles sent for test were canned fruits, condensed milk, egg-yolk, glue, honey, soap, pills, meat extracts, parchment paper, printer's roller compositions, tanning extracts, sauces, ketchups, canned peas and canned pork and beans. The number of samples of sugar and articles containing sugar or other sweetening matter examined for assessment of duty or drawback was 71,912, as compared with 71,782 in the preceding year. In connection with the assessment of duty on British-made glucose, 270 samples were taken during the course of manufacture; 816 samples were examined for assessment of drawback on exportation, in addition to 52 samples of imported glucose and of glucose used in syrups made at sugar refineries.

During the year, the recovery of radium from decayed luminous paint has been continued and approximately 150 milligrams of partially purified radium salt was obtained. In addition, 242 milligrams of partially purified radium was converted into high-grade salt of 66 per cent. purity. A solution of radium D was prepared and was used for the preparation of 11 ionising rods covered with polonium for use by the Meteorological Office.

A considerable amount of work has been done by the staff in connection with the revision of existing methods and the investigation of new methods of detection and determination of substances. Towards the end of the previous year and in the year covered by the present report, advice was required by an Inter-Departmental Committee in connection with the question of freeing flue gases from oxides of sulphur. As an experimental plant was laid down at one of the power stations, opportunity was taken to ascertain the efficiency of the process of washing out the sulphur acids from the flue gases and also to test an automatic recording apparatus devised in the Government Laboratory for determining the quantity of sulphur acids present after the gases have been scrubbed.

The technical staff of the Department has been re-organised on the basis of the report of the Committee on the Staff of Government Scientific Establishments, but the full application of this report cannot be completed for some time. At present the staff consists of the Government Chemist, the deputy Government Chemist, six superintending chemists, eleven senior chemists, four chemists (higher grade), thirty-three chemists, and six assistants. In addition there are twenty-three of the obsolescent class of temporary assistant chemist, ninety-one laboratory assistants (likewise obsolescent), and thirty-six officers of Customs and Excise who have been seconded to the department to be trained for service in the chemical stations.

Parent Coal Carbonisation Trust

Company's Statement of Affairs

THE summary of the statement of affairs of the Parent Coal Carbonisation Trust, Ltd., in compulsory liquidation, showing gross liabilities £103,654, has been issued by Mr. E. T. A. Phillips, the Official Receiver. Of these £14,380 are unsecured, and the assets are estimated to realise a surplus of £102,256 with regard to creditors. In relation to the shareholders, however, a deficiency of £604,612 is shown.

The Official Receiver reports that the company was registered in February, 1929, to adopt certain agreements and to acquire the rights for the United Kingdom of a secret process for low-temperature carbonisation of coal known as the Aicher process. It had a nominal capital of £750,000, all of which has been allotted for cash. Unpaid calls, however, amounted to £43,150, and are considered irrecoverable. The energies of the company have been entirely devoted to erecting plant at Belvedere, Kent, and its failure is attributed by the secretary to lack of capital to carry out its programme.

The Official Receiver comments that in his opinion the company was doomed to failure when it was forced to buy other property as a condition of being paid for the shares it had issued, and that the board should never have gone to allotment. The Receiver for the prior lien debenture-holders is of the opinion that only in the event of the assets being acquired en bloc by a purchaser with a view to the further exploitation of the carbonisation process is there any possibility of enough funds being realised to pay off debentures and the preferential claims, and that there is no possibility of any surplus becoming available for distribution among the unsecured creditors or the shareholders.

New French Potash Deposits

FOLLOWING recent discoveries of potash deposits in the Landes (south-western) region of France, it is expected that French potash production will be further developed. A concession has been granted at Boudigot, south of Dax, with a view of exploiting potash and magnesium deposits. It is stated that these deposits are extensive, chloride of potassium being particularly abundant. French potash production in 1931 amounted to 1,088,485 tons of crude sylvinite, compared with 1,589,680 tons in 1930.

Empire Oilseeds and Vegetable Oils

Production and Trade Statistics

THE importance to the world generally, but more particularly to the Empire, of the trade in vegetable oils and oilseeds is the subject of a report on "Oilseeds and Vegetable Oils," which has just been published by the Empire Marketing Board (E.M.B./C/4, H.M. Stationery Office, price 6d.). This report reveals that the Empire produces 65 per cent. of palm oil, 60 per cent. of copra, 59 per cent. of sesame seed, 58 per cent. of the palm kernels, and nearly one-half the groundnuts consumed throughout the world. Omitting large quantities of soya beans grown and used in China, and of cotton-seed in the United States, the Empire provides more than one-half of the world's oilseeds and nuts. India, Nigeria and Gambia have raced ahead in recent years in the production of groundnuts. At present 10 per cent. of all the exports of India consists of oilseeds and oilcake. British Malaya, Ceylon, and about a dozen or more British islands in the South Seas specialise in coconuts, whilst over 16 per cent. of Ceylon's exports consist of coconut oil, copra (the dried meat of the cocoanut) and desiccated cocoanut. The Empire is particularly well supplied with the oils used in the manufacture or margarine and soap, yet the United Kingdom, which is among the chief seed-crushing countries, imports largely cottonseed, linseed and soya beans, supplies of which within the Empire are not very considerable. The bulk of the groundnuts from India and Nigeria, of the copra from British Malaya and Ceylon, and even the West African palm kernels and palm oil, go to Germany, France and other foreign countries.

The vegetable oils compete to a greater or less degree with one another for various purposes, although a few of them have rather special uses. Castor oil competes with the mineral oils, and for edible, cooking or manufacturing purposes the chief vegetable oils are in competition with animal fats such as butter, lard and tallow, and also with marine oils—fish and whale oil production having reached a total of over 600,000 tons in the season 1930-31.

Average Import Prices

In volume of production, soya beans slightly precede cottonseed in the world as a whole, with groundnuts and others some distance behind, but in actual oil content, were the whole output crushed, there is little to choose between soya beans, cottonseed and groundnuts, with copra, owing to its high oil yield, not far behind. Average United Kingdom import prices over the five years 1926-1930 have been about £11 2s. per ton for soya beans, £8 8s. for cottonseed, £16 16s. for undecorticated groundnuts, £25 for copra, £16 2s. for linseed, and £65 for olive oil, which suggests that from the point of view of gross revenue to producers, soya beans are in the aggregate about about 50 per cent. more valuable than either cottonseed or groundnuts, which are in turn nearly double the value of linseed, copra or olive oil. The aggregate value of the whole of the vegetable oilseed group, together with olive and palm oils, would, on the basis of United Kingdom import values in 1926-1930, be of the order of only about £700,000,000, which is barely one-half the value of the world's wheat crop computed in the same manner, and is probably less in value than the total output of butter. Important as the oil-bearing plants are, and rapidly as they are increasing, they do not yet approach in value any of the world's leading farm products.

The British Empire is well provided with many of the oil-bearing plants. Over one-half the world's production of palm kernels, palm oil, sesame seed, castorseed, and probably of rapeseed lies within the Empire, which also accounts for a considerable share of the world's output of copra and groundnuts. It is, however, surprising to find that barely one-fifth of the world's cottonseed, only one-eighth of its linseed, a negligible proportion of its olive oil, and virtually none of its soya beans, sunflower seed, hempseed and tung oil are of Empire origin. In terms of oil equivalent the Empire probably produces rather over 25 per cent. of the world total, being particularly well furnished in those nuts and seeds from which are produced the oils most commonly used in margarine and soap manufacture.

The largest producers of several of the chief oilseeds retain the bulk of their crops for home use. Thus the United States, India and China export only a very small proportion of their cottonseed; India and China export respectively about 23 per cent. and 6 per cent. of their groundnuts; while China's exports of soya beans, including oil, represent no more than 21 per cent. of the estimated total production. Russia's exports of sunflower seed, West Africa's exports of palm oil, and Indian and Chinese exports of rape and sesame seed are also small in relation to the total production. On the other hand palm kernels, linseed, castorseed and copra are in most of the leading countries produced mainly for export.

While the bulk of the palm kernels and castorseed produced in the world, and rather more than one-half the linseed and copra (including cocoanut oil), are shipped out of the countries where they are grown, the proportion of the world's output entering international trade is estimated at barely 25 per cent. for olive oil, palm oil and groundnuts, at little over 20 per cent. for soya beans including oil), at under 15 per cent. for rapeseed and sesame seed, and at only 6 per cent. for cottonseed. Some countries depend very largely upon oilseeds and their products for their export trade. Thus Gambia's exports consist almost entirely of groundnuts, while palm kernels and palm oil constitute 75 per cent. of the exports of Sierra Leone, 48 per cent. of those of Nigeria and 19 and 13 per cent. of those of the Belgian Congo and French West Africa. About 32 per cent. of the export trade of the Phillipines and 16 per cent. of that of Ceylon is made up of copra and coconut oil; and 20 per cent. of China's exports consist of soya beans and their products, with wood oil, groundnuts, sesame and other seeds making up a further 8 per cent. Linseed represents 13 per cent. of Argentina's export trade, and oilseeds and oilcake of all descriptions about 10 per cent. of that of India.

Principal Importing Countries

Empire countries being amongst the largest producers of a number of oilseeds and oils, they are also among the chief exporters of those products. On the other hand, the United Kingdom plays a much smaller part in the import trade than in that of most of the world's foodstuffs and raw materials. The seed-crushing industry is particularly strong on the continent of Europe, where there is a ready outlet both for vegetable oil and for oilcakes, and the chief importers of copra, linseed, groundnuts, palm kernels, soya beans, rapeseed and sesame seed are Germany, France, Italy and Holland—together with the United States and Japan. The following table shows for each of the principal oilseeds or nuts the three chief importers, together with their average net imports for 1926-1930 expressed as a proportion of aggregate net imports into all countries, according to the figures compiled by the International Institute of Agriculture.

Oilseed or Oil.	Country.	Per-centage.	Country.	Per-centage.	Country.	Per-centage.
Cottonseed	United Kingdom	81	Japan	11	Denmark	2
Groundnuts	France	38	Germany	34	Italy	8
Linseed	United States	24	Netherlands	17	Germany	17
Copra	United States	24	Germany	20	France	18
Palm kernels	Germany	57	United Kingdom	31	Czecho-slovakia	3
Soya beans	Germany	39	Japan	30	Denmark	9
Sesame seed	Japan	18	Germany	14	Italy	13
Rapeseed	Japan	28	Germany	12	United Kingdom	12
Olive oil	United States	31	Argentina	24	France	7

The confusion in the trade statistics of some countries between palm oil and palm kernel oil prevents any similar comparison in respect of palm oil. The export figures of producing countries suggest that the United States takes about one-half the world supply, the United Kingdom taking less than 20 per cent., and Germany, third in order, rather less than 10 per cent. It is noticeable that while the United Kingdom imports only a small proportion of the world's groundnuts, copra, rapeseed and sesame seed, and but a moderate proportion of the palm kernels and palm oil—all of these being products of which the Empire is a large contributor to world supplies—yet of cottonseed, for which the Empire plays a much less prominent part in production and

export, the United Kingdom is overwhelmingly the largest importer. Taking all oils and oilseeds together and making a comparison upon the oil equivalent of the seeds, Germany is easily the largest importer, France the second largest, and the United Kingdom third.

British Empire countries other than the United Kingdom have only small imports of oilseeds, and the Empire's position as a net importer or exporter is governed by the United Kingdom imports on the one hand, and the exports from India and the colonies on the other. Of cottonseed the Empire is an importer to the extent of over 350,000 tons annually, and of linseed and soya beans net imports average 108,000 tons and 123,000 tons respectively, while there is a moderate net importation of olive oil. For other seeds and nuts the Empire is, on balance, a large and generally an increasing exporter to the rest of the world, net exports averaging nearly 700,000 tons of groundnuts, 347,000 tons of copra, 154,000 tons of palm kernels, 88,000 tons of palm oil and 27,000 and 33,000 tons respectively of sesame seed and rapeseed.

In the supply of vegetable oils and of raw materials for the extraction of vegetable oils, it is apparent that the Empire's exports to the rest of the world are far larger than the quantities she draws from foreign countries. Of whale oil, also, which is increasing rapidly in importance, production by Empire whalers is substantially greater than the Empire's consumption.

International Latex Processes

New Company Formed

A NEW company, International Latex Processes, Ltd., has been formed by the Anode Rubber Co., Ltd., and the United States Rubber Co. for the purpose of consolidating all patents on latex manufacture held by these two companies throughout the world, excepting the United States of America. It is stated that there has recently arisen a rapidly growing interest in the use of latex for various manufacturing purposes, but that developments have been retarded owing mainly to complexities in the patent position. The new company has been framed so as to make possible the admission of the owners of other latex patents. It is not a manufacturing company. It has been formed with the object of simplifying the patent position, co-ordinating research and development, and extending the use of latex by making the patented processes readily available to others, and by giving to licensees the technical knowledge acquired by the participants in the company over a long period of experimental research and actual production.

It is understood that Sir Eric C. Geddes, chairman of the Dunlop Rubber Co. and of the Anode Rubber Co., will be chairman of the new company, and Mr. F. B. Davis, junr., chairman and president of the United States Rubber Co., will be vice-chairman.

Interchangeable Ground Glass Joints

A Novel Development in Laboratory Glassware

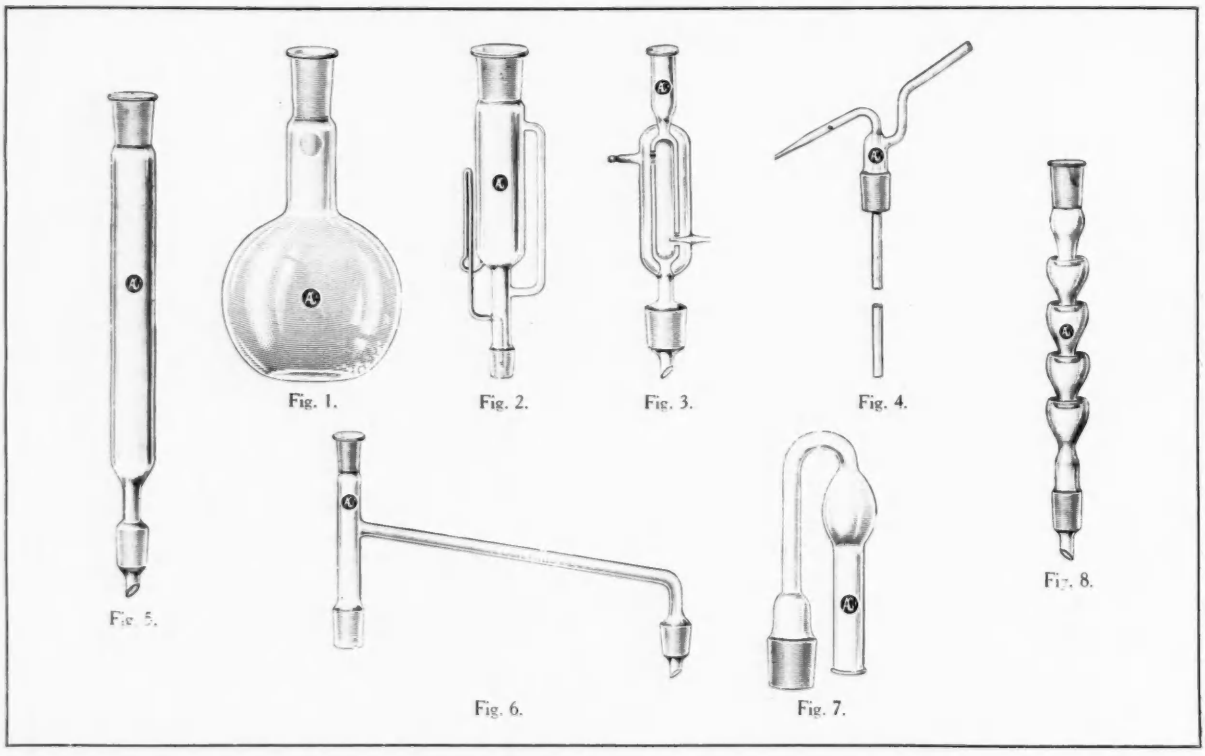


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

APPARATUS with interchangeable standard ground glass joints has recently been manufactured by A. Gallenkamp & Co., Ltd. The apparatus, which includes flasks, extractors, condensers, etc., is entirely of British manufacture, and can be supplied in a wide range of sizes. Its adoption in the laboratory should be a distinct advantage in comparison with the older type apparatus, which is often rendered useless by the breakage of one particular part. With the new standard ground glass joints any broken part of the apparatus can be replaced from stock with the certainty that it will be a perfect fit to the exising parts, as the specification adopted for standard grinding is a rigid one. At present standard fittings can be supplied in soda glass, Pyrex glass, Monax glass and transparent fused silica. Round bottom and flat bottom flasks (Fig. 1) are available in sizes from 100 to 1,000 c.c. Among items of special interest there are still-heads (Fig. 6), fractionating columns (Figs. 5 and 8), Soxhlet extractors (Fig. 2), condensers (Fig. 3), pump adaptors, receivers for vacuum fractionation, washbottle heads (Fig. 4), thistle funnel heads, Claissen flask necks, and drying tubes (Fig. 7).

Tri-Sodium Phosphate

Use in Boiler Feed Water Treatment

THE essentials of the treatment of boiler feed water is the removal of all foreign material whether in solution, coarse suspension or colloidal dispersion. An exception is the presence of such alkali salts as result from the treatment of the water for the removal of hardness, etc. Fundamentally there are two problems. The one is the removal of existing scale; the other is the prevention of the formation of scale forming solids from the water. These problems are discussed by Kroemer in a recent issue of "Chem. Zeit."

Loosening the Scale

For the purpose of loosening already-formed scale, a 1-3 per cent. tri-sodium phosphate solution is fed into the boiler. The amount of the alkaline salt cannot be pre-determined by analysis. It depends upon the nature and extent of the scaling in the boiler. The equation representing a general case is $3XY + 2Na_3PO_4 \longrightarrow 3Na_2Y + X_3(PO_4)_2$ where X = Ca, Mg. and Y = CO_3, SO_4, SiO_2. Theoretically about 1.8-2.5 kg. tri-sodium phosphate is required for 1 kg. scale. A certain amount of the phosphate solution is added, and the boiler heated. The water is then tested for soluble phosphate, and more sodium tri-phosphate is added if required. If after the first boiling an excess of soluble phosphate is found the boiling is repeated and the water again tested, and so on, until the process is finished and a permanent slight excess of sodium phosphate is shown by test. It is advisable to test after the boiler water content has been allowed to reduce under working conditions. In all cases, at the first opportunity, the boiler is thoroughly cleaned out after the phosphate treatment.

A Choice of Three Methods

If it is necessary to add the phosphate during the running of the boiler, about 0.5-1 kg. per cub. m. is added until an excess is known to be present. During the process the boiler should be run at half pressure because of the quick loosening of the scale and the possibility of foaming, etc. A second method is to feed into the boiler to be scaled a continuous stream of phosphate solution (0.5 to 2 mg. per litre). This method is, however, subject to certain unavoidable possibilities of error. A third method is to add to the feed water the correct amount of phosphate as determined by analysis. In this case no scale can form from the new feed water and an excess of phosphate may be added in order to deal with a scale already present in the boiler. It should be noted that when a phosphate treated water is to be tested for hardness it must be filtered before neutralisation with HCl to weak rose colour with phenolphthalein, otherwise the fine precipitate of insoluble phosphates will dissolve in the acid and the true hardness figure will not be obtained.

As far as possible the precipitates which form are removed outside the boiler. Softening inside the boiler itself may only be done under certain conditions. The boiler must be of the insensitive type, have small working pressures, heating surface of not above 100 sq. m.; the water supply must have low hardness and be otherwise favourable, small loads, economical use of condensed water, and absence of softening plant. This method should not be used unless circumstances make it absolutely necessary, and careful supervision should be exercised. Every effort should be made to use some form of softening apparatus even if it is only a kind of heating exchange apparatus which will have the effect of removing some of the hardness, with the result that the scaling in the boiler will be considerably lessened.

An After-Softener

When tri-sodium phosphate is used as an after-softener, the amount of chemicals used in the first or main softening plant may be reduced. In the usual precipitation methods, especially with the carbonate, it is necessary to use a decided excess of the alkali in the softening process and this can be avoided by the use of phosphate in a second softening process. This has the advantage of reducing the amount of soluble salts in the feed water entering the boiler. The best way of using the tri-sodium phosphate is to remove most of the hardness in the ordinary softening plant and then to treat the feed water with a determined amount of the phosphate in a special reactor into which the water is fed through a filter, or failing this, after settling in a vessel with a sloping base which facilitates the settling and clearing of the sludge. One very decided advantage of using phosphate arises from its flocculating effect on oil present in condenser water which is used again as feed water. The oil is adsorbed in the phosphate containing precipitate. In exceptional cases it may be necessary to carry out the second softening immediately prior to feeding the water into the boiler. This should not be done unless absolutely essential and the comments given above should be noted very carefully in this connection.

Dominion Lead Monopoly

Protest by the Accumulator Makers' Association

THE Accumulator Makers' Association has written to the Import Duties Advisory Committee stating that no effective steps have yet been taken to protect their industry from exploitation on the part of the monopoly controlling the supply in this country of Dominion-produced lead. The accumulator industry, it is pointed out, is still having to pay, and without any redress, whatever premium this Dominion lead monopoly care to impose, while foreign competitors have a wide choice of alternative supplies at the London world price free of this imposition. This represents a very serious handicap upon the export business in British-made accumulators. It is submitted that "the imposition of a premium by the suppliers of Dominion lead, whose interests the government sought to promote by a duty on foreign lead, is an unscrupulous and serious exploitation of the lead users of this country" and that the only practical solution is to put lead on the free list.

An amendment to the Tariff Bill in the House of Commons to put lead on the free list was withdrawn on a statement by Mr. Neville Chamberlain, to the effect that the Government "did not intend to tolerate any undue exploitation of the consumer" and a promise that action would be taken if the threatened dangers of a premium arose. If the removal of the duty on foreign lead should be rendered impossible by the Ottawa Agreement, then, according to the Accumulator Makers' Association, the only alternative is for the Government speedily to devise machinery to protect the accumulator makers from the imposition of any premium over and above the London market price. It is pointed out that although the premium charged by the Dominion lead monopoly has already been reduced, it remains purely arbitrary and there is no security that it may not be seriously increased if the Ottawa agreements are ratified.

The Accumulator Makers' Association represents, on a basis of lead consumption, well over 95 per cent. of the accumulator industry of this country, using approximately 30,000 tons of lead per annum, and employing some 4,000 persons.

Bombay Chemical Industry

Exploitation of Natural Soda

THE administration report of the Industries Department of the Bombay Presidency shows that the chemical industry, except the heavy chemical industry, on the whole did fairly well during 1931-32. The soap factories worked at their full capacity, and some new soap works were started during the year. The pharmaceutical manuacturers and the makers of toilet goods, such as cold cream, hair oils, perfumes, etc., are reported to have done well. Several new products of the toothpaste, shaving cream and shampoo types not hitherto produced in the Presidency are now being manufactured satisfactory. With regard to the heavy chemical industry, there are now three large works in the Presidency, but two of them are worked at a loss.

A number of investigations are in progress, among which the work on natural soda has been found to be encouraging. It has been ascertained that unless definite conditions for the separation of sodium carbonate and bicarbonate from natural soda have been worked out, the natural soda found at various places cannot be efficiently utilised. The best way to separate the carbonate and bicarbonate has been found to be one taking advantage of the laws of solubility. Work which has already been done shows that higher temperatures favour the separation.

Alleged Infringement of Artificial Silk Patents

British Celanese, Ltd., v. Courtaulds, Ltd.

THE hearing was continued on November 10, in the Chancery Division, by Mr. Justice Clauson, of the action by British Celanese, Ltd., of Celanese House, Hanover Square, W., against Courtaulds, Ltd., of St. Martin-le-Grand, E.C., for injunctions restraining infringement of three patents related to the production of artificial silk. The earlier stages of the case were reported in THE CHEMICAL AGE of November 5 (p. 438) and November 12 (pp. 459-460). Defendants denied infringement of all the patents and alleged that they were invalid on various grounds, chiefly prior publication and prior common general knowledge. They counter-claimed for revocation of the patents on these grounds.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., Mr. E. J. Neep, and Mr. H. D. Russell Clarke appeared for plaintiffs, and Mr. J. Whitehead, K.C., Sir S. Cripps, K.C., Mr. Trevor Watson, K.C., and Mr. G. Tookey, for the defendants.

Mr. Swinburne was further cross-examined as to his knowledge of the prior documents, which the defendants contended had anticipated plaintiffs' patents.

Mr. Whitehead began to question witness on a textbook on silk production when, Sir Arthur Colefax said he objected to the questions on the ground that the contents of the book did not necessarily prove common knowledge on the subject. Sir Arthur added that the case might not stop at that Court's decision, and therefore one had to be careful.

His lordship over-ruled the objection and Mr. Whitehead put questions raised in the textbook.

"False" Twisting

On the question of false twist as used in connection with a weak slide, Mr. Swinburne thought it was useful.

In re-examination Mr. Swinburne agreed that the success of plaintiffs' process did not seem to be due to cheapness of the materials used as compared with pre-war prices.

Sir Arthur: Was there anything in common knowledge in your view to suggest to one this important bond that existed in the nitro industry as being a process which would prove itself of real utility?—No. The process was not obvious.

Mr. Swinburne was further re-examined on Friday. He demonstrated the working of a model "false" twisting machine to his lordship and counsel and expert witnesses as they were assembled round the witness box.

Sir Arthur: When you are speaking of an evaporative or dry spinning process are you contemplating anything but the evaporation of a solvent?

Mr. Swinburne: I was not. Under the plaintiffs' first patent, he added, the solvent was evaporated from the cellulose derivative, whereas in the production of artificial silk for viscose by evaporative process they would evaporate water and decompose the stuff that was coming through. He would not describe the water as a solvent.

Unnecessary Re-examination of Witness

Whilst Sir Arthur was continuing his re-examination, his lordship, addressing Sir Arthur, said he had had clear evidence in cross-examination from Mr. Swinburne and he was rather disturbed at the re-examination, which consisted of putting questions to him, which looked as if they were intended to give him an opportunity of going back on what he had said in cross-examination.

Sir Arthur said that was not his intention and he was sorry if he had pursued a course which did not meet with his lordship's approval.

His lordship said the case was a complicated one and he was alive to its difficulties but he hoped they would not have such lengthy re-examination of witnesses as they seemed to be threatened with.

Dr. Emil Bindschedler, of the United States, doctor of philosophy and chemistry (Zurich), said he was conversant with the artificial silk industry and particularly the production of nitro silk. During the war the nitro silk industry at Sarvar, where he was technical expert, was suspended. As far as he knew only one American company was in the cellulose acetate silk industry and that was in Virginia. In 1922 cellulose acetate became a competitor to some extent with nitro-cellulose. A few years ago, about 1926-1928, cellulose acetate became a competitor with nitro-cellulose. There were difficulties about dyeing cellulose acetate, but he believed they had gradually been overcome. In his view no important changes had been made by plaintiffs' in spinning or winding and plant had remained substantially the same.

On Monday, Mr. E. Bindschedler again went into the witness box, and was further examined by Sir Arthur Colefax on the question of prior publication.

Cross-examined, witness said it would be untrue to suggest that the question of his competence or his knowledge of nitro-cellulose were the reasons for the termination of his engagement with the American company with which he had been associated.

On Tuesday, Mr. Bindschedler was further cross-examined. Witness could not say whether on the Continent there was at one time little or no cap spinning of worsted.

Mr. Whitehead: Can you give any instance of the use of cap spinning of any textile on the Continent prior to the war?—I do not know anything about it.

Replying to other questions witness said he knew that "top and box" was used in the spinning of artificial silk. He considered the use of a bobbin and taking it to another bobbin to get the twist, quite a reasonable thing. He thought it was advantageous to do it.

Mr. Whitehead was putting to witness questions in regard to spinning, when witness exclaimed, "You are describing to me nothing different from what was done in the old days of the viscose industry." Witness added that there was only one successful factory in the United States making nitro-cellulose silk and that was in Virginia. They did not use the respondents' process because they could not get it. In his opinion the difficulties which had been suggested would be found in applying a Celanese process to nitro silk were not real ones.

Simultaneous Twisting and Winding

Professor A. H. Barker, professor of textile industries at Leeds University and a member of the council of the Silk Research Association, said he had visited Canada and Australia and other countries to report on textile matters. He had also visited the plaintiffs' works and saw the spinning machines at work, including cap spinning. Had he had to consider the simultaneous twisting and winding of filaments continuous to production at a speed of 100 metres per minute he would have thought of all the matters already employed and have realised that there would be mechanical difficulties. The cap spinning surprised him very much. With regard to lubrication oil should be used on the slider in order that it might become distributed on the fibres.

Witness said if he were going to compete with the French he would use flier spinning, but if he competed here he would use cap spinning.

On Wednesday, Mr. Barker again went into the witness box, and was further cross-examined by Mr. Whitehead.

Witness was questioned in regard to lubrication, and Mr. Whitehead said he was going to put to the witness a question based on the Wool Year Book.

Witness: I compiled it for some five years or so. It has been issued yearly since 1910. It expressed the opinions of a number of people at the end of the book.

Mr. Whitehead said he wished to call the witness's attention to the statement in the book that the sprinkling of oil on various parts was necessary to prevent waste by fly or breakage of fibres on various machines.

Witness said that was known. In his view the bobbin was a winding and twisting apparatus. He had paid two visits to plaintiffs' factory to see the cap spinning. At the time he had no idea that cap spinning was applied to cellulose acetate silk.

With regard to twisting and reeling, Mr. Whitehead drew

witness's attention to a statement in a book by witness which contained a chapter on silk throwing and spinning.

Witness said he was responsible for the book, but the chapter in question was written by someone else.

Mr. Whitehead said in that chapter the writer said "The modern method is of twisting and reeling at the same time."

Witness: It is one operation and is the standard method.

Mr. Whitehead: For how long has it been in use?

Witness: I cannot say. I should anticipate that it has been in use for many years.

His lordship: During the whole of your experience?—Witness: Yes.

Replying to further questions, Professor Barker said he was not aware that cap spinning for cotton was still in use in 1870. It was abandoned because it did not produce a satisfactory yarn.

Mr. Granville Hugh Baillie, a consulting engineer practising in London, said he had read the specifications of plaintiffs' patents and the documents put against it. The invention provided for downward spinning from an enclosed casing was a principle entirely new and a useful one. He had gone through the prior publications set up by the defendants and broadly speaking not one of them published this invention.

The speed contemplated by plaintiffs, in their invention, was about a hundred metres a minute, but witness had visited plaintiffs' factory and had seen spinning down at the rate of 300 metres a minute. The increased speed was a remarkable step indeed.

The hearing is proceeding.

Letter to the Editor

The Institutes of Chemistry

SIR,—Any communication from the fearless pen of Professor H E. Armstrong provides food for thought for all those who are interested in chemistry. The first of his articles on the Institutes of Chemistry, published in THE CHEMICAL AGE on October 29, is no exception to this rule, but, like many vigorous presentations, it gives undue prominence to one aspect of at least one of the situations dealt with. The section of Professor Armstrong's article to which I wish to refer is that which contains his attack on biochemistry and biochemists.

Professor Armstrong states that all the real work in biochemistry has been done by real chemists, and, on that account, he considers that biochemists should leave their own flourishing society to re-enlist under the banners of the Chemical Society. Such a desertion is not likely to occur, and one reason for this is contained in Professor Armstrong's article, where, quite rightly, he states that the biochemist should possess a sound knowledge of physiology. Professor Armstrong has, apparently, not considered that it is just this intimacy with physiology, or, more generally, with biology, that has brought about the divorce of biochemistry from what Professor Armstrong terms real chemistry. The biochemist seeks to utilise his chemical skill to further our knowledge of the organism and, at one time, hoped to build up a chemical explanation of what constitutes the living organism. He has, however, now realised that such an explanation is impossible and has had to discard the mechanistic views of the chemist, which yield but a partial explanation of the phenomena of life, and has turned for guidance to the biologist.

The biologist takes life as a fact of experience, and discards mechanistic explanation together with its frivolous overcoat of vitalism. The organism and its environment is considered as forming one whole, and the maintained coordination within that whole is the expression of life itself. By means of this conception of wholeness, biology has been raised to the rank of an independent science to which chemistry and physics may, in the future, have to turn for inspiration. The Dreamer of Fair Hydrone has, indeed, already upheld a similar wholeness for the system of solvent and solute.

It is true that chemistry has done much to aid the advancement of biology. Yet biochemistry consists of more than the detection of this or that chemical compound in what was once part of a living organism. Due regard must be taken of the fact that the wholeness of a living organism constitutes more than the mere sum of its parts. Thus, though the biochemist still uses chemical methods of investigation and should, therefore, as Professor Armstrong urges, be a competent chemist, he no longer restricts himself to chemical terms in the discussion of his results. Biochemical papers may, on this account, appear inordinately long to the chemist.

Professor Armstrong urges a return to the past. The biochemist, on the other hand, looks to the future, where, strengthened by his contact with biology, he hopes to obtain a view of reality which will be less distorted than any yet obtained through mechanistic spectacles.—Yours faithfully,

E ROMER DAWSON.

9, Woodcote Hall,
Epsom, Surrey.

Forthcoming Events

Nov. 21.—Institution of the Rubber Industry (Manchester Section). "Solvent Recovery." E. Liddle and J. Lloyd. College of Technology, Manchester.

Nov. 21.—Society of Chemical Industry and Institute of Chemistry (Edinburgh Sections). "Photo-Electric Cells and their Application." R. G. Walker.

Nov. 22.—British Science Guild. Norman Lockyer Lecture, by Sir Frank Smith. 4.30 p.m. Goldsmiths' Hall, Foster Lane, London.

Nov. 23.—Leicester Literary and Philosophical Society (Chemistry Section). "The Evolving Chemist." S. F. Burford. 7.30 p.m. The Museum, Leicester.

Nov. 23.—Alchemists' Club. "The Latent Image." Professor Slater Price. 7.30 p.m. University, Glasgow.

Nov. 25.—Manchester Literary and Philosophical Society. "Works Transport." Dr. F. G. Fenelon. 7 p.m. 35 George Street, Manchester.

Nov. 25.—Chemical Engineering Group. "Problems of Emulsion Persistence." W. Clayton. Burlington House, London.

Nov. 25.—Society of Dyers and Colourists (Scottish Section). "Sulphonated Lorol and Ocenol. Latest Problems and Developments." M. Briscoe. George Hotel, 235 Buchanan Street, Glasgow. 7.15 p.m.

Nov. 25.—Institute of Chemistry and Society of Chemical Industry (Scottish Sections.) "Corrosion of Metals in Salt Solutions and Sea Water." Dr. G. D. Bengough. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Nov. 25.—Institute of Chemistry (Belfast Section). Annual Dinner. Belfast.

Nov. 25.—Chemical Society. Liversidge Lecture. "Physical Atomic Weights." Dr. F. W. Aston. 5.30 p.m. University, Birmingham.

Nov. 25.—Society of Chemical Industry (Food Group), and Society of Medical Officers of Health (Metropolitan Branch). Joint Meeting. Discussion on "Bacteriological Standards for Milk and Ice Cream." 5.30 p.m. London School of Hygiene and Tropical Medicine Gower Street, London.

Nov. 25.—Society of Chemical Industry (Birmingham and Midland Section). "Physical Atomic Weights." Dr. F. W. Aston. 5.30 p.m. University Buildings, Edmund Street, Birmingham.

Nov. 26.—Oil and Colour Chemists' Association (Manchester Section). 8th Annual Dinner and Dance. 7 p.m. "The Manchester," Ltd., Royal Exchange, Manchester.

Nov. 26.—Institute of Metals (North East Coast Section). "New Demands on the Brass Foundry." J. Arnott. 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Nov. 26.—British Association of Chemists. Fifteenth Annual General Meeting. Annual Dinner and Dance. 7 p.m. Midland Hotel, New Street. Birmingham.

Nov. 28.—University of Birmingham Chemical Society. "The World and the Chemist." Dr. L. H. Lampitt. 5.30 p.m. University, Birmingham.

Nov. 29.—Hull Chemical and Engineering Society. "Fuel Oil and its Application to Industrial Purposes." O. S. Sharratt. 7.45 p.m. Grey Street, Park Street, Hull.

Portuguese Insecticide Imports

ITALY supplied 277 of the 278 metric tons of agricultural insecticides and fungicides imported into Portugal during 1931. The average Portuguese consumer of agricultural insecticides is familiar with only sulphur, copper sulphate and Bordeaux mixture; hence a satisfactory trade in proprietary products would be difficult to establish. The United States supplied one-fourth of the 40 tons of "other insecticides," which category includes household sprays.

British Overseas Chemical Trade in October

An Improvement in Exports—Imports Decline

Exports of chemicals, drugs, dyes and colours during October amounted to a total of £1,369,090, being £87,238 lower than the figures for October, 1931. Imports totalling £766,960 were lower by £823,803, and re-exports totalling £38,651 were lower by £23,949, as compared with October, 1931. (Exports during September, 1932, were £1,104,104, as compared with £1,208,740 during September, 1931.)

	Quantities. Month ended October 31. 1931	1932.	Value. Month ended October 31. 1931. £	1932. £
Imports.				
Acetic Anhydride cwt.	445	252	1,297	750
Acid, Acetic .. tons	778	782	26,519	25,356
Acid, Tartaric, including Tartrates .. cwt.	5,210	1,600	22,667	5,967
Bleaching Materials ,,	12,178	9,656	36,248	10,199
Borax .. .. ,,	14,413	9,180	8,436	4,098
Calcium Carbide .. ,,	91,921	85,159	57,377	51,138
Coal Tar Products, not elsewhere specified value	—	—	5,454	10,335
Glycerine, Crude .. cwt.	1,878	—	2,123	—
Glycerine, Distilled ,,	2,949	542	6,451	957
Red Lead and Orange Lead cwt.	5,242	1,909	6,822	1,981
Nickel Oxide .. ,,	395	108	1,745	390
Potassium Nitrate (Saltpetre) .. .. cwt.	9,011	4,519	8,275	4,344
Other Potassium Compounds .. .. cwt.	961,119	486,281	232,221	133,077
Sodium Nitrate .. ,,	177,939	—	72,669	—
Other Sodium Compounds cwt.	51,939	25,744	55,848	17,677
Tartar, Cream of .. ,,	2,257	726	8,994	2,419
Zinc Oxide .. tons	1,054	30	23,577	671
Other Chemical Manufactures .. .. value	—	—	405,520	181,246
Quinine and Quinine Salts oz.	100,386	48,260	8,350	5,159
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	579	1,767	3,102	9,565
Other Drugs .. value	—	—	153,903	69,339
Intermediate Coal Tar Products .. cwt.	62	101	450	385
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	—	—	—	—
Other Dyestuffs .. ,,	4,573	2,229	111,355	47,256
Cutch .. .. ,,	1,593	1,341	2,576	1,421
Other Extracts for Dyeing	2,624	963	10,463	3,444
Indigo, Natural .. ,,	—	10	—	141
Extracts for Tanning (Solid or Liquid) cwt.	113,221	123,149	85 877	76,745
Barytes, Ground .. ,,	47,883	22,859	9,631	4,351
White Lead (Dry) ,,	18,443	3,020	25,311	3,914
Other painters' colours and materials .. cwt.	150,839	70,117	197,502	94,635
TOTAL .. value	—	—	1,590,763	766,960
Exports.				
Acid, Sulphuric .. cwt.	1,532	3,826	1,422	2,114
Acid, Tartaric, including Tartrates .. cwt.	965	881	4,907	3,905
Ammonium Chloride (Muriate) .. .. tons	327	221	5,177	4,772
Ammonium Sulphate ,,	41,646	27,642	215,447	121,658
Bleaching Powder (Chloride of Lime) .. cwt.	52,001	59,429	15,326	16,217
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	6	—	8
Benzol and Toluol gal.	165,433	3,029	10,285	413
Carbolic Acid (crude)	1,425 gal.	6,945 gal.	300	1,248
Carbolic Acid (crystals) cwt.	1,134	1,225	2,722	4,537
Cresylic Acid .. gal.	63,800	98,710	7,142	11,151
Naphtha .. ,,	798	12,248	89	813
Naphthalene (excluding Naphthalene Oil) cwt.	6,811	8,430	1,643	2,187
Tar Oil, Creosote Oil, etc. .. .. gal.	2,009,724	1,874,848	46,355	32,271
Other Sorts .. cwt.	4,329	21,379	5,900	13,214
COAL TAR PRODUCTS value	—	—	74,436	65,842
Copper, Sulphate of tons	692	218	11,475	3,597
Disinfectants, Insecticides, etc. .. .. cwt.	41,129	40,962	104,911	99,513
Glycerine, Crude .. cwt.	1,489	2,238	1,505	2,419
Glycerine, Distilled ,,	6,280	13,839	13,534	26,509
Potassium Chromate and Bichromate .. cwt.	1,446	729	3,101	1,853
Potassium Nitrate (Saltpetre) .. .. cwt.	1,985	1,727	3,300	2,875
Other Potassium Compounds .. .. cwt.	5,373	1,153	9,553	6,644
Sodium Carbonate, including Crystals, Soda Ash and Bicarbonate cwt.	194,458	252,069	56,998	65,941
Caustic Soda .. ,,	130,678	193,221	85,312	111,656
Sodium Chromate and Bichromate .. cwt.	764	1,543	1,370	2,911
Sodium Sulphate, including Salt Cake .. cwt.	100,907	42,792	11,428	5,895
Other Sodium Compounds cwt.	50,896	80,417	55,009	66,226
Zinc Oxide .. tons	557	1,492	11,157	26,725
Other Chemical Manufactures .. .. value	—	—	221,561	228,475
Quinine and Quinine Salts	136,826	68,032	13,753	9,450
Other Drugs .. value	—	—	256,808	193,401
Dyes and Dye-stuffs (Coal Tar) .. .. cwt.	9,553	13,225	82,833	91,289
Other Dyestuffs .. ,,	12,987	17,296	10,089	15,885
Barytes, Ground .. cwt.	4,158	3,183	1,388	1,349
White Lead (Dry) ,,	1,371	1,822	2,369	3,188
Paints and colours in paste form .. .. cwt.	17,493	19,737	30,622	33,360
Paints and Enamels prepared .. .. cwt.	27,805	28,124	80,702	77,752
Other painters' colours and materials .. cwt.	38,091	45,599	70,835	77,669
TOTAL .. value	—	—	1,456,328	1,369,090
Re-Exports.				
Acid, Tartaric, including Tartrates .. cwt.	133	45	675	239
Borax .. .. ,,	809	30	480	18
Coal Tar Products, not elsewhere specified value	—	—	4	8
Potassium Nitrate (Saltpetre) .. .. cwt	77	69	103	84
Sodium Nitrate .. ,,	701	14,874	259	4,996
Tartar, Cream of .. ,,	577	162	2,420	667
Other Chemical Manufactures .. .. value	—	—	10,573	8,675
Quinine and Quinine Salts Salts .. .. oz.	28,693	4,950	938	681
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	352	271	2,498	2,681
Other Drugs .. value	—	—	36,656	16,508
Cutch .. .. cwt.	526	102	1,246	140
Other Extracts for Dyeing cwt.	174	73	1,263	308
Indigo, Natural .. ,,	8	6	146	129
Extracts for tanning (Solid or Liquid) .. cwt.	3,957	347	3,546	325
Pa,nters' colours and materials .. .. cwt.	586	224	1,357	580
TOTAL .. value	—	—	62,600	38,651

Testing of Cellulose Materials

The Importance of Viscosity

THE Department of Scientific and Industrial Research has now issued a report containing the recommendations of the Sub-Committee of their Fabrics Research Committee which was appointed to consider the adoption for industrial purposes, of a uniform method of determining the viscosity of solutions of cellulose and of expressing the results. Copies of this report, "The Viscosity of Cellulose Solutions," are obtainable from H.M. Stationery Office, price 1s.

The measurement of cellulose viscosity has now become a very valuable means for process control and for purchasing raw materials in many industries, e.g., cotton, linen, rayon, paper, explosives, cellulose lacquer, etc. In the preface to the report the chairman to the Fabrics Research Committee, Dr. R. H. Picard, F.R.S., who is director of the Cotton Research Association, states that the Department has been informed by the technical advisers of large cellulose interests that viscosity measurement will eventually become a deciding factor in many arbitrations concerned with the quality of raw and finished cellulose materials, and that some cases have already arisen in which the issue was obscured by lack of uniformity in the method of making the measurement, and of expressing the result The sub-committee was therefore formed to meet an expressed desire from the industry for considered recommendations that might lead to the general adoption of a standard method and form of expression for industdial purposes. The sub-committee comprises Dr R. H. Pickard (chairman), G. Barr, D.Sc. (National Physical Laboratory), D. A. Clibbens, Ph.D. (British Cotton Industry Research Association), A. Forster, D.Sc. (War Office), W. H. Gibson, D.S.S., F.I.C (director, Linen Industry Research Association), H. Ainsworth Harrison, M.Sc., F.I.C. (Technical Section, Paper Makers' Association of Great Britain and Ireland), L. A. Jordan, D.Sc., F.I.C. (director, Research Association of British Paint, Colour and Varnish Manufacturers), and Professor J. I. O. Masson, D.Sc., F.I.C.

British Standards Institution

Specification for Manhole Openings on Plant

A NEW specification for manhole openings for chemical plant has just been published by the British Standards Institution. The question of the protection against accident when cleaning out process vessels, mobile tanks and storage tanks has been one which has occupied the minds of chemical engineers for some time. It was felt that the need for standardisation was long overdue and that a lead in this direction would be specially welcomed by the chemical industry, and, in particular, by the chemical plant manufacturers.

During the preparation of this specification a wide range of processes was examined, with a view to introducing standards for general application. The evidence collected pointed to the need for fixing the minimum number and sizes of openings in vessels and tanks to allow of adequate ventilation during emptying, cleaning, repair, and to give a reasonable chance for effective rescue work in cases of accidents. To meet the varying conditions of service, vessels are classified as process, mobile or storage tanks. There has been no attempt to lay down a standard design—this is left to the individuality of the manufacturer. The specification is therefore, stated, in general terms, to give latitude in detail design for pressure or vacuum work and for special cases.

The technical committee responsible for the drafting of the specification was presided over by Rr. J. C. Kellam and the following organisations were represented: Association of British Chemical Manufacturers, Association of Tar Distillers, British Chemical Plant Manufacturers' Association, Institute of Brewing, Institution of Petroleum Technology, Society of Chemical Industry and Institution of Chemistry.

The British Standards Institution has recently issued the report on the activities of the three divisions—engineering, building and chemical—presented at the last annual general meeting, with which is incorporated the indexed list of the British Standard Specifications. Copies of this publication are available from the British Standards Institution (Publication Department), 28 Victoria Street, London, S.W.1, price 1s 2d., post free.

Steel Combustion Tubes

Higher Temperatures in Ultimate Analysis

INTEREST will be aroused by the announcement of a special steel made by the Mannesmann Tube Co., which is suitable for the production of combustion tubes for the ultimate analysis of organic compounds, exhaustive tests having demonstrated its non-reactivity with carbon and other elements The possibilities of considerably increased speed of analysis is suggested by the fact that the new steel combustion tubes withstand a maximum temperature of 1,200° C., as compared with 850° C. in the case of Jena glass. A minor drawback is the superior conductivity for heat which may cause rubber stoppers to stick to the ends of the tube, but this can be overcome by the attachement of a small water-cooling device to the end of the tube. Evidence of the termination of the combustion, which cannot be obtained by inspection owing to the opacity of the tube, is indicated by the appearance of larger bubbles in the potash bulbs.

Chemical Matters in Parliament

Chemical Warfare

IN the House of Commons on November 11, Mr T. Williams (York, West Riding, Don Valley), asked the Financial Secretary to the War Office, whether the Chemical Warfare Committee had any agreement or understanding with any manufacturer concerning the supplying of offensive or defensive materials for use in chemical warfare; if so, what are the names and addresses of the manufacturers concerned; and what was the amount of any financial assistance given in virtue of such agreement or understanding.

Mr. Cooper replied that the War Department had no agreement or understanding with any manufacturer regarding the provision of material for offensive use in chemical worfare. As regards defensive measures arrangements were in force with certain manufacturers under which respirators were assembled, and chemicals required for the testing of those respirators were obtained. It would not be in the public interest to disclose further details.

Mr. Williams then asked for the names of all universities or other educational institutions or private research establishments to which grants are given for chemical research work.

Mr. Cooper said he presumed the question referred to research work in connection with chemical defence. The only institution was Oxford University, where certain scientists were carrying out experiments for which payment was made from Army funds.

Pottery Research in America

Volume Changes due to Weathering

THE United States Department of Commerce has obtained during the last three years some definite knowledge on the effect of weathering on the volume of ceramic materials, which has just been published. Samples of wall tile, terra cotta, and dinner ware were selected for observation and subjected to the autoclave test. A similar group of samples was exposed to actual weathering, and a third group was subjected to a moisture-saturated atmosphere. At the end of the first year approximately the same percentage increase in length was shown in the three groups.

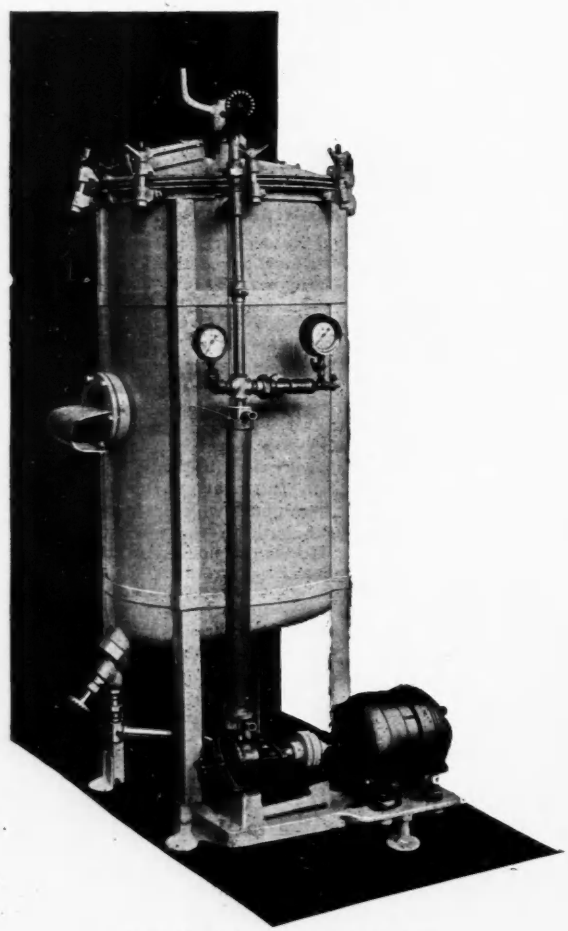
At the end of the second year the samples exposed to the weathering and to the damp atmosphere showed, with an exception in each service, a greater increase in length than in the autoclave treatment. All the measurements at the end of the third year, which has just been completed, showed a further increase in length, but those kept in the damp atmosphere showed a rather greater increase of length, with two exceptions, than those exposed to the weather.

FRENCH caustic soda export trade held up fairly well during the first half of 1932, while soda ash declined. French exporters of these alkalis cater chiefly to the European markets. Exports for the first half of the years 1930, 1931 and 1932 are as follows: Caustic soda, 18,752 metric tons, 15,583 tons and 18,646 tons respectively; and soda ash, 83,432 tons,, 66,025 and 60,068 tons respectively.

Works Equipment News

Modern Aids for the Chemical and Allied Trades

ALTHOUGH there is a wide range of products which need percolation, the standard " Pfaudler " glass lined percolator, as supplied by the Enamelled Metal Products Corporation, Ltd., will be found to meet practically every requirement. It incorporates the new pressure-vacuum principle which eliminates " channeling " and gives the maximum extraction. It operates on a closed system so that evaporation losses are



The " Pfaudler " Glass Lined Percolator

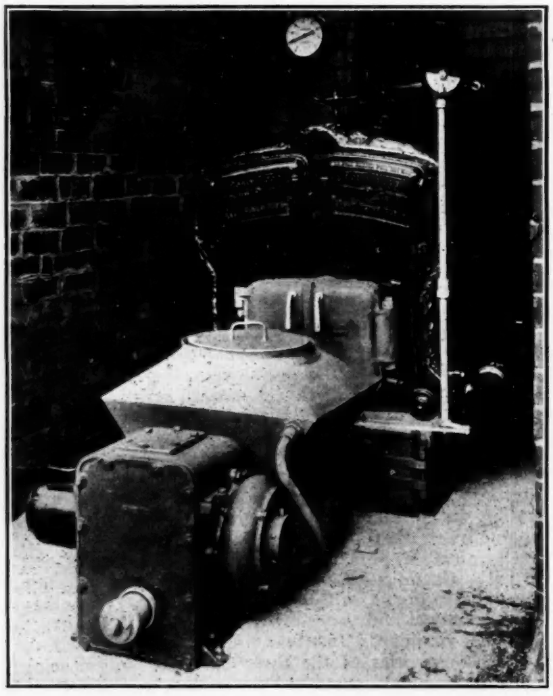
reduced. The interior of the tank is glass lined—thus minimising the risk of metallic flavours developing in the product. The glass lining also makes cleaning easier and facilitates the complete emptying of the tank. A steam heating device is usually supplied with the standard " Pfaudler " percolator. This permits a second percolation of the same pack and enables the maximum quantity of extract to be obtained.

The tank of the "Pfaudler " percolator is constructed of open hearth steel plate into the interior surface of which the special glass lining is fused at a high temperature. The machine has a working capacity of 40 imperial gals. and is equipped with the standard fittings and accessories, including Pyrex glass observation windows, complete with electric light, which enables the process to be kept under observation above the pack and below the basket. The circulating pump is driven by a $\frac{3}{4}$ h.p. direct connected electric motor.

In operation the basket is packed either outside the percolator or in position, and preferably in two layers. This can be done by using perforated plates purchasable from the makers of the equipment. When the basket is in position the cover is swung into line and lowered until it is flush with the tank, the sanitary circulating line is then connected and the clamps tightened. A turn of the switch starts the motor running and the menstruum is circulated through the line, flooded over the pack by means of the distributing device, and forced down through it by pressure which is synchronously applied with vacuum below. The level of the menstruum above the basket can be controlled by means of the air relief valve shown in the accompanying illustration. During processing the pressure gauge will commonly register about 8 lb., and the vacuum gauge about 4 in.; this may vary, but the above figures are satisfactory. The relief valve has been set to 10 lb. and takes care of any over-pressure which might build up above the basket; its purpose is to by-pass the menstruum back into the vacuum chamber of the percolator. During percolation, the progress and colour of the percolate may be observed through the observation glasses; samples may be taken through the sampling cock. The first percolation is run cold, producing the virgin extract; the second and third percolations can be accomplished using heat. When the percolation process is finished the three-way valve is turned and the pump forces the product to the storage tanks.

A New Mechanical Stoker

FOR more than thirty years The Underfeed Stoker Co., Ltd., has been selling a mechanical stoker for Lancashire boilers and for 15 years a stoker for water-tube boilers. The same organisation that designed and constructed these stokers (now Combustion Engineering, Ltd.) has turned its attention to a small stoker for firing central heating and hot water boilers. The design of this new stoker, the " Robot Fireman," is fundamentally that of the stoker which continues to hold the premier place in its field for Lancashire boilers. Its advantages over ordinary hand-firing are threefold. First,



The " Robot Fireman "

in place of expensive anthracite or coke, a cheap coal can be used, owing to the fact that the fuel is in a continual state of movement, ensuring an intimate mixture of fuel and com-

bustion air; secondly, entire elimination of labour except the 10 minutes required every 12 to 18 hours to fill the fuel hopper and remove the clinker; thirdly, there is no loss of water temperature incuurred by repeatedly opening the furnace doors when hand-firing is in operation. Further, the objectionable fumes so frequently found with hand-fired boilers are avoided.

Coal is placed in the container or hopper, whence it falls into a trough or retort, and down this it is pushed by a conveyor screw into the furnace. The fire is lit in the usual way with sticks and the machine is started slowly, power being supplied by a small motor which may be as low as ⅓ h.p.. When the fire is well alight the fuel supply, which is continuous, is increased. The supply of coal is regulated by the automatic adjustment of a ratchet, and the air supply, both forced and induced, by lampers. The adjustment of the fuel and air supplies is controlled by a thermostat placed in the heated water outlet; this thermostat is an essential part of the stoker equipment, and by this means the fuel and air supplies are automatically reduced or increased as required. This " Robot Fireman " is made in eight sizes, burning from 45 lb. of coal (of medium heating value) maximum per hour on the smallest unit, to a maximum of 350 lb. per hour on the largest unit.

Electric Heat Treatment Equipment

IN co-operation with the city of Sheffield, Wild-Barfield Electric Furnaces, Ltd., have been demonstrating the most modern types of electric heat treatment furnaces in use by prominent Sheffield manufacturers. The actual demonstration closed on November 12, but an illustrated brochure describing the exhibits is still obtainable on application. Among the exhibits were automatic hardening furnaces of the horizontal type, embodying an indicator to show the exact quenching moment for carbon, carburised and low alloy steels; hardening furnaces of the vertical type suitable for work which is either liable to distort if heated horizontally or which lends itself to batch quenching; general purpose workshop furnaces; high temperature furnaces; and laboratory muffles for chemists and metallurgists. There was also a large general heat treatment furnoce of the box type, which can be built to any desired size, and with standard heating elements, is suitable for temperatures up to 1,050° C. Uniformity of temperature and close control render this type of furnace eminently suitable for accurate heat-treatments, whilst, being thoroughly insulated with suitable materials, it is efficient and economical in use. In the case of large furnaces dealing with heavy charges, provision is made for the use of a mechanical charging machine. The processes for which these furnaces are used include carburising, refining, hardening, normalising and annealing of steel parts, vitreous enamelling, and many other operations.

A further exhibit comprised tempering furnaces with forced air circulation. These furnaces are used for all low temperature processes requiring uniformity and close control, the maximum temperature being 700° C. Steel tempering, the secondary hardening of high speed steel, the heat treatment of aluminium alloys and other similar processes are within the range of this type of equipment, which includes a charge progress recorder to show when the work itself has reached the desired temperature.

Improvements in Microscopes

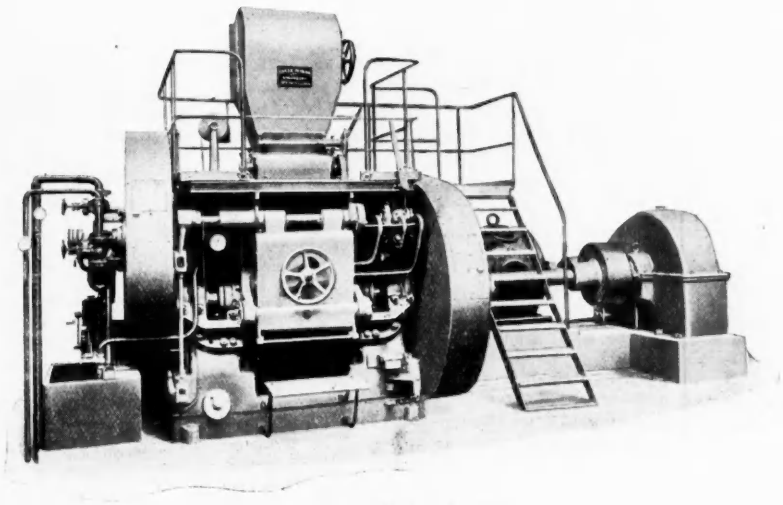
IT is not generally realised that the development of the microscope in the past has been due to the work of English scientists. In no other country will be found so many technical microscopists interested in microscope improvement. Of recent years W. Watson and Sons, Ltd., have made many improvements. Rigidity is only obtainable by a reduction of parts. To ensure increased rigidity, efficiency and durability, Watson's have recently remodelled the body tube and limb design. In the microscope limb the bearings for the substage and the fine adjustment are now machined in one operation. Thus, the remodelled optical bench limb ensures basic rigidity, and permanent fundamental alignment.

Most microscopes, with the exception of Watson's, have a body formed by a tube which is screwed and soldered or riveted and soldered to the rib which carries the rackwork and from the sides of which the coarse adjustment slide is machined. In the latest Watson microscopes the body tube and rib slide are machined from a solid billet of brass, this is drilled out to form a tube but is not completely penetrated by the tool, the end of the casting being threaded to carry the nosepiece or objective. The drilling and threading establish the optic axis. The coarse adjustment slide is then machined on the rib so that the mechanical and optical axes are parallel and bound to remain parallel throughout the life of the instrument. The importance of this outstanding advance resulting from and construction of the body will be readily appreciated.

Mixing and Kneading Machines

The solution of new problems in mixing and kneading such as confront the chemical engineer from time to time is usually found to have been anticipated, except in detail, in the " Universal " machine originated many years ago by Baker Perkins, Ltd. Guesswork in mixing and kneading was eliminated by the invention of this machine, and although numerous modifications in design and construction have been made to keep abreast of the chemical engineers' rquiremnts, the basic principle which established the " Universal " in the first place remains the heart of the machine to-day and is likewise the inspiration of all other "Universal" mixers. Here there are two blades of special design revolving at unlike

"Wild Barfield" Hardening Furnace.



Latest Type Rubber Mixer.

speeds in opposite directions in two hollow semi-cylinders, the intersection of which forms a saddle-piece across which the ingredients are continually divided by the blades—the effect being to produce a perfectly homogeneous mixing of materials with the minimum expenditure of time and energy.

Originally the "Universal" mixer was designed for the range of standard "Universal" mixers available, with jacketed or partly jacketed troughs. In some cases the blades are hollowed for steam or water circulation; there are more efficient mixing and kneading of the ingredients of bread doughs, but it was apparent to the inventor that the principle would find application in many circumstances where a similar physical action was required, and constant experiment has given rise to innumerable variations such as the set and shape of the blades and their relative speeds, in the type of jacket and the method of discharging. To-day there are also special constructions for mixing under vacuum, and by a combination of these varied and variable features practically any requirement of the chemical engineer can be quickly met. The most recent developments have been special designs for the rubber, plastic and artificial silk trades, and as new problems arise, Baker Perkins will continue their policy of experimenting to ascertain what particular application of the "Universal" principle will meet the case.

A Novel Steam Jacketed Filter

THE Cannon Iron Foundries, Ltd., make a large variety of plant for the chemical industry, particularly for the manufacture and the handling of acids. The plant is generally of a special type, designed to meet the requirements of the particular manufacturer. They make several types of vessels for the storage of acids, in addition to pipes of various bores for conveying acids to different points. An interesting example of a steam jacketed filter, made by them, is shown in the accompanying illustration. It is constructed in two hinged sections, with a perforated plate. There is an inlet pipe in the upper section and an outlet pipe in the lower section, screwed to standard pipe connections. An eye bolt is fitted at the top and the two sections are secured together with clamps. This filter is made of acid-resisting enamelled cast iron, and it is used for concentrated salt solutions, sodium sulphate, copper sulphate and organic liquids. Another

Steam Jacketed Filter.

Cannon product is a small scale recovery plant used in the production of synthetic resins, comprising a steam jacketed mixing still, lined with special acid-resisting enamel, coil condenser and recovery vessel, all lined like the still. The firm's booklet shows some illustrations of modern steam jacketed mixing pans, prepared to the specifications of the A.B.C.M. and B.C.P.M.A. which have been improved and adopted by the British Standard Institution. The gearing and agitator can be removed easily from the pan; combined fittings are provided comprising steam inlet and outlet valves, water inlet and outlet valves and blow-off. This enables the pan to be used for steam or water. A slight variant of this is the closed-type mixing pan, which is fitted with dome cover and outlet in the bottom with a gland. The cover has light and sight glasses, thermometer pocket, changing pole, and a reasonable clearance is given below by pillar legs.

Vitreosil in the Chemical Industry

KEEN competition and abnormal depression in the chemical industry compels progressive manufacturers to equip their works with the most efficient plant. Not only, however, must the design of the plant embody the latest results of scientific research in this connection, but the material of which the plant is constructed should possess those properties and physical characteristics which in the chemical industry are regarded as *sine qua non*. Vitreosil (pure fused quartz or silica) is therefore the ideal material for this purpose. It has been manufactured for over a quarter of a century by The Thermal Syndicate, Ltd. This useful constructional material posesses remarkable thermal endurance, is chemically inert, has a high melting point (about 1,700° C.) and does not sweat, crack, craze or disintegrate. It is therefore possible to close down vitreosil plants and restart them quickly without risk of damage or mishap.

Realising the advantage afforded by this material, The Thermal Syndicate have devoted special attention to the construction and development of plants for the manufacture of nitric sulphuric, hydrochloric and other acids and chemicals. Fig. 1 shows one of their 2½ ton plants for the synthetic production of hydrochloric acid. We also illustrate a longitudinal section of a vitreosil absorption vessel now largely adopted in the manufacture of hydrochloric acid on account of its remarkable efficiency in operation (Fig. 2). Successful plants are now in operation both at home and abroad. Owing to improvements in manufuacture, vitreosil containers or reaction vessels of large size, up to 260 gallons capacity, are now available, whilst socket and other pipes and bends of large size, suitable for pipe lines and scrubbing towers, can be supplied.

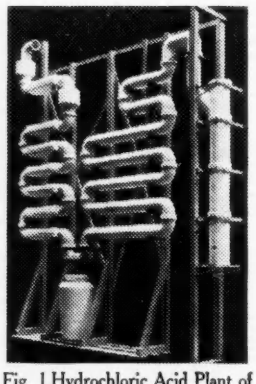


Fig. 1.Hydrochloric Acid Plant of 2½ Tons Capacity.

Vitreosil laboratory ware is now so much used in all up-to-date analytical and research laboratories, that it is only necessary to refer to a few of its more prominent advantages. It

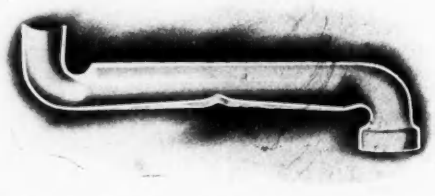


Fig. 2. Vitreosil Absorption Vessel (longitudinal section.)

is heat and acid proof, constant in weight, has a high melting point, small expansion coefficient, and can be subjected to sudden and extreme temperature change without risk of breakage. For these and its many other valuable properties, it is superior to porcelain and for many purposes may be used as a substitute for platinum. The Thermal Syndicate, Ltd., issue a useful brochure entitled "About Vitreosil" which will be sent post free on application.

German Carbon Black Demands

IMPORTS of carbon black into Germany showed gains in both quantity and value during the first half of 1932, contrasted with trade during the corresponding period of 1931. Total purchases of the commodity amounted to 3,209 tons, compared with 2,914 tons during the same months of 1931. United States supplied practically the entire requirements or 3,104 tons in the first half of 1932 and 2,877 tons in the 1931 period.

News from the Allied Industries

Sugar

THE INTERNATIONAL SUGAR COUNCIL will hold their next meeting in Paris on November 29, instead of December 12.

China Clay

THE TOTAL OUTPUT OF CHINA CLAY and stone from Cornwall during October showed a slight improvement on the previous month. Details of consignments were as follows:—46,449 tons of china clay (compared with 43,891 tons in September), 2,266 tons of china stone (as against 4,562 tons last month): 1,519 tons ball clay (in comparison with 645 tons in September). The volume of china clay sent direct by rail to destination was 4,753 tons in October and 4,530 tons in September. Shipping at Fowey also showed improvement last month, but nearly 14,000 tons less than in October, 1931.

Matches

THE SWEDISH MATCH CO. has confirmed the report that it does not intend to ask for an extension of the moratorium granted after the Kreuger crash, which expires at the end of this month. It is stated that all the foreign banks have accepted the plans for reconstruction put forward by the Swedish Match Co., and that only unimportant obstacles of a purely formal nature stand in the way of acceptance of the plans by all the Swedish banks. The moratorium was originally granted at the beginning of June last for a period of three months, but at the end of that period it was found that all the creditors had not signified their definite acceptance of the reconstruction scheme, and an extension for another three months was sanctioned

Iron and Steel

ACCORDING TO THE MONTHLY RETURN of iron and steel production issued by the National Federation of Iron and Steel Manufacturers, there were fifty-nine furnaces in blast at the end of October, the same as at the beginning of the month, two furnaces having started operations, and two having been blown out. Production of pig-iron in October amounted to 275,600 tons, compared with 260,400 tons in September and 284,200 tons in October, 1931. The production includes 58,400 tons of hematite, 134,200 tons of basic, 66,900 tons of foundry, and 9,600 tons of forge pig-iron. The output of steel ingots and castings amounted to 438,500 tons, compared with 430,300 tons in September, and 457,400 tons in October, 1931.

Artificial Silk

A PETITION FOR THE COMPULSORY WINDING-UP of Atlas Artificial Silk Processes, Ltd., has been allowed to stand over until November 21.

THE UNITED GLANZSTOFF FACTORIES CO., of Wuppertal-Elberfeld, reports an improvement of business during September and a reduction in its rayon stocks. It has not yet been possible to increase employment, as it remains to be seen whether or not the improvement is maintained.

THE DIRECTORS OF MELSO, LTD., manufacturers of artificial silk and wool fabrics, propose to return £50,000, or 6s. 8d. per share to the preference shareholders, as the company has cash resources in excess of their requirements. The nominal value of each of these shares will thus be reduced from £1 to 13s. 4d. If the reduction of capital is carried into effect, it is proposed to increase the authorised capital by £50,000 in order to save duty. Shareholders are asked to consent to the conversion of both preference and ordinary shares into stock, transferable in multiples of 13s. 4d. in the former case and in multiples of 5s. in the latter.

THE WORLD PRODUCTION OF RAYON has increased during the first nine months of 1932 as compared with the corresponding months of 1931. The total is given as 352,045,000 lb., against 345,570,000 lb. in 1931. This result has been achieved despite a substantial diminution of the United States' rayon output. The increase is attributed to larger production in Great Britain and Japan. Italy, Germany and Holland show decreases. The estimated figure for the United States is 80,895,000 lb., against 103,345,000 lb. last year; Italy, 54,450,000 lb. (56,010,000 lb.); Great Britain, 54,080,000 lb. (36,980,000 lb.); Japan, 47,060,000 lb. (35,000,000 lb.); Germany, 40,005,000 lb. (41,050,000 lb.)

Mineral Oil

THE AGUILA OIL CO. (Royal Dutch-Shell group) has consented to participate to the extent of $83,000,000 in a $87,000,000 loan to the Mexican Government, which President Rodriguez requested the oil companies to make. The loan is in the nature of a tax advance to be repaid within 40 months. The Huasteca Petroleum Co. (Standard Oil group) has also participated to the extent of $83,000,000. The purpose of the loan is not disclosed.

Cement

ALLEGATIONS that British cement manufacturers were "dumping" cement in the American market have led to strong action by the United States Customs Bureau. Thirty United States firms recently gave evidence before the U.S. Commissioner of Customs, alleging that British cement was being sold in the New York market not only below the cost of production in America, but also below the price at which the same brands of cement were sold in Britain. In consequence, all cement imported from Britain will be subject to a 100 per cent. import bond. The measure is a temporary one.

Rubber

THE SOVIET INSTITUTE OF APPLIED CHEMISTRY has announced the discovery of a new method of making synthetic rubber from acetylene. The costs of the new method, it is stated, are lower than under the other method already used in some Soviet factories which manufacture synthetic rubber with alcohol as a starting point.

PRELIMINARY FIGURES issued by the Rubber Growers' Association indicate that a further substantial decline in rubber production has taken place during the past month. Of the 615 companies reporting to the association returns have been received from 353, the combined output of which amounted to 9,288 tons. Compared with the corresponding month of last year this is a reduction of 2,152 tons, or nearly 19 per cent. All the producing countries have contributed to the decline. Malaya's total of 6,419 tons represents a reduction of 10.3 per cent., while the output of Sumatra, the second in importance, has fallen from 1,762 tons to 1,428 tons. Ceylon's total of 677 tons compares with 1,097 tons reported for October of last year.

Non-Ferrous Metals

THE LONDON TIN CORPORATION have agreed to proceed with the acquisition of the shares of Malayan Tinfields. The allotment of shares of London Tin Corporation to those shareholders of Malayan Tinfields whose acceptances have been received is now proceeding. Acceptances will be received up to November 30, 1932, and from shareholders in the Far East within a reasonable time.

MR. MURDOCH, from the Noranda Mines, and M. Pisart, from the Katanga Mines in the Congo, have arrived in New York to attend the World Copper Conference, which is to discuss the disposal of electrolytic stocks and the curtailment of output. Mr. Murdoch declared on landing that the British tariff on electrolytic copper would probably take effect as from December 1.

THE ROAN ANTELOPE COPPER MINES, LTD., have issued their accounts for the year ended June 30 last. These accounts are the first actual operating accounts to be issued by any of the big Northern Rhodesian copper companies. The restriction of output to about one-third of capacity and the unprecedented low price of copper have naturally adversely affected earnings, the profit and loss account, which covers a period of ten months from September 1, 1931, showing that the gross total amounted to £156,740. After providing for debenture interest and transferring £10,000 to depreciation reserve, however, the net result is a loss of £30,760. The company is finding no difficulty in disposing of its output, sales of copper made up to June 30 covering the whole of the tonnage produced to that date. Moreover, a long-term contract has been entered into with British Copper Refiners, Ltd. (whose refinery at Prescot, Lancashire, is nearing completion), for the sale of a large tonnage of blister copper commencing on January 1 next.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF SULPHURIC ACID ESTERS OF ALCOHOLS. W. W. Groves (*I. G. Farbenindustrie*). July 17, 1931. 382,942.

PROCESS FOR MAKING 2-CHLOR-ARYLTHIAZOLES. Goodyear Tire and Rubber Co. Nov. 19, 1930. 382,940.

MANUFACTURE OF AROMATIC OXY-COMPOUNDS AND AROMATIC OXYCARBOXYLIC ACIDS. W. W. Groves (*Chemische Fabrik von Heyden A.-G.*). Aug. 13, 1931. 382,909.

MANUFACTURE AND PRODUCTION OF POLYMERISATION PRODUCTS FROM INDENE, OR STYRENE, VINYL ESTERS, AND LIKE MONOVINYL COMPOUNDS. I. G. Farbenindustrie. Oct. 2, 1930. 383,002.

PRODUCTION OF CONDENSATION PRODUCTS. Dr. W. Kraus. Oct. 27, 1930. 383,025.

PROCESS FOR INCREASING THE EXTENSIBILITY OF ARTIFICIAL THREADS, ESPECIALLY ARTIFICIAL SILK MADE FROM CELLULOSE DERIVATIVES SUCH AS CELLULOSE ACETATE. Algemeene Kunstzijde unio Naamlooze Vennootschap. Nov. 8, 1930. 383,028.

MANUFACTURE OF CELLULOSE ACETATE. Kodak, Ltd. Nov. 5, 1930. 383,043.

SEPARATION IN THE ANHYDROUS STATE OF FATTY ACIDS CONTAINED IN DILUTE AQUEOUS SOLUTIONS. Usines de Melle. Nov. 3, 1930. 383,049.

MANUFACTURE OF AZO-DYESTUFFS ON THE FIBRE. Soc. of Chemical Industry in Basle. Nov. 15, 1930. 383,064.

PROCESS FOR MANUFACTURING FILMS FROM CASEIN. S. Wittouck. Feb. 27, 1931. 383,069.

PRODUCTION OF CLEAR AND TRANSPARENT ARTIFICIAL RESIN MASSES. Aug. Nowack Akt.-Ges., and Dr. R. Hessen. Dec. 10, 1930. 383,085.

PRODUCTION OF ALUMINIUM DERIVATIVES OF ACETYL-SALICYLIC ACID. Chinoin Fabrik Chemisch-Pharmaceautischer Produkte A.G. (*Dr. V. Kereszty and Dr. Wolf*) and Dr. B. Wolf. April 15, 1931. 383,112.

PROCESS OF DEHYDRATING AQUEOUS ACETIC ACID. Kodak, Ltd. March 20, 1931. 383,148.

PROCESS FOR AFTER-TREATING ARTIFICIAL SILK. British Bemberg, Ltd. March 16, 1931. 383,149.

MANUFACTURE OF STABILISED HALOGEN DERIVATIVES. I. G. Farbenindustrie. March 25, 1931. 383,154.

PROCESS OF PRODUCING PERFECTLY HOMOGENEOUS SOLUTIONS OF DRYING AGENTS. I. G. Farbenindustrie. May 2, 1931. 383,172.

PRDUCTION OF SOLUBLE DRIED MILK. C. Knoch and A. E. Saunders. May 3, 1932. 383,193.

PRODUCTION OF BERYLLIUM ALLOYS OF THE HEAVY METALS. I. G. Farbenindustrie. May 28, 1931. 383,200.

MANUFACTURE AND PRODUCTION OF MOULDED POLYMERISATION PRODUCTS. I. G. Farbenindustrie. Oct. 2, 1930. 383,216.

MANUFACTURE OF AN EMULSION OF WOOL FAT. I. G. Farbenindustrie. July 14, 1931. 383,238.

Applications for Patents

MANUFACTURE OF COAL GAS. H. J. Herrera and W. G. Herrera. Nov. 5. 31273.

MANUFACTURE OF AZO DYESTUFFS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 4. 31148.

CATALYTIC DEHYDROGENATION OF POLYNUCLEAR HYDROCARBONS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 4. 31149.

MANUFACTURE OF CEMENT POWDERS. I. G. Farbenindustrie. Oct. 31. (Germany, Oct. 29, '31.) 30542.

MANUFACTURE OF ARSENO-COMPOUNDS. I. G. Farbenindustrie. Nov. 1. (Germany, Dec. 12, '31.) 30763.

PRODUCTION OF BLEACHING POWDER. I. G. Farbenindustrie. Nov. 2. (Germany, Nov. 2, '31.) 30879.

MANUFACTURE OF AMINO AZO COMPOUNDS. I. G. Farbenindustrie. Nov. 4. (Germany, Nov. 7, '31.) 31167.

MANUFACTURE OF AZO DYESTUFFS. I. G. Farbenindustrie. Nov. 5. (Germany, Nov. 30, '31.) 31308.

STABILISATION OF BLASTING EXPLOSIVES. Imperial Chemical Industries, Ltd. Nov. 3. 31037.

PREPARATION OF SUBSTITUTED THIAZOLES OF SELENAZOLES. J. D. Kendall. Oct. 31. 30647.

PREPARATION, ETC., OF CATALYTIC AGENTS. E. R. W. de Mahler. Nov. 1. 30704.

MANUFACTURE OF ACID ANHYDRIDES. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 3. (United States, Nov. 3, '31.) 31048.

PRODUCTION OF PREPARATIONS CONTAINING ACETYL SALICYLIC ACID. Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury and Van der Lande. Oct. 31. (Holland, May 21.) 30614.

ABSORPTION REFRIGERATING APPARATUS. J. Park. Oct. 31. 30471.

STABILISATION OF AQUEOUS SOLUTIONS CONTAINING HYDROGEN PEROXIDE. Roessler and Hasslacher Chemical Co. Oct. 21. (United States, Nov. 2, '31.) 30511.

PRODUCTION OF A FLEXIBLE TRANSPARENT LIQUID-PROOF, ETC., MATERIAL. J. W. Rowe and Transparent Paper, Ltd. Nov. 4. 31176.

FILTRATION OF GASES. Soc. Italiana Pirelli. Oct. 31. (Italy, Nov. 3, '31.) 30675.

CONVERSION OF HYDROCARBON OILS. Universal Oil Products Co. Nov. 1. 30751.

METHODS OF MAKING CELLULOSIC DISPERSIONS IN LIQUIDS. R. Audubert. Nov. 7. (France, Nov. 5, '31.) 31395.

PRODUCTION OF LACTIC ACID AND ITS SALTS. Bamag-Meguin Akt.-Ges. Nov. 9. (Germany, Dec. 7, '31.) 31641.

MANUFACTURE OF POTTERY ARTICLES. W. Bloore and W. Lindley. Nov. 7. 31321.

MANUFACTURE OF WETTING AGENTS FOR MERCERISING LYES, ETC. A. Carpmael (*I. G. Farbenindustrie*). Nov. 9. 31683.

PRODUCTION OF PROPIONIC ACID BY FERMENTATION. Commercial Solvents Corporation. Nov. 8. (United States, June 29.) 31544. 31545.

ALUMINIUM ALLOY, AND PROCESS FOR ITS MANUFACTURE. C. E. Denney and A. D. Wakelin. Nov. 7. 31407.

ALLOY STEELS. Electro Metallurgical Co. Nov. 12. (United States, Dec. 10, '31.) 32012.

ELIMINATING ARSENIC FROM CONCENTRATED SULPHURIC ACID. H. Frischer. Nov. 10. 31802.

CARBON-DIOXIDE LET-DOWN VALVE. F. B. Grant (*Imperial Chemical Industries, Ltd.*). Nov. 7. 31423.

MANUFACTURE OF POLYMERISATION PRODUCTS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 7. 31373.

MANUFACTURE OF PRINTING-MEANS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 7. 31374.

MANUFACTURE OF BENZANTHRONE. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 10. 31790, 31791.

MANUFACTURE OF POLYNUCLEAR HYDROCARBONS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 10. 31792.

MANUFACTURE OF ANEMULSION OF WOOL FAT. I. G. Farbenindustrie. benindustrie). Nov. 9. (Germany, Nov. 9, '31.) 31667.

MANUFACTURE OF INSULATING MATERIALS. I. G. Farbenindustrie. Nov. 10. (Germany, Nov. 11, '31.) 31854.

MANUFACTURE OF AZO DYESTUFFS. I. G. Farbenindustrie. Nov. 10. (Germany, Nov. 11, '31.) 31855.

VAT DYESTUFF PREPARATIONS. Imperial Chemical Industries, Ltd. Nov. 7. 31420.

MANUFACTURE OF IMPROVED DYESTUFF PREPARATIONS. Imperial Chemical Industries, Ltd. Nov. 7. 31421.

DEGREASING BY MEANS OF VOLATILE SOLVENTS. Imperial Chemical Industries, Ltd. Nov. 7. 31422.

APPARATUS FOR CARRYING OUT OPERATIONS AT LOW TEMPERATURES. Imperial Chemical Industries, Ltd. Nov. 9. 31695.

MANUFACTURE OF DERIVATIVES OF 1 : 1'-DINAPHTHYLS. Imperial Chemical Industries, Ltd., and R. F. Thomson. Nov. 9. 31696.

PRODUCTION OF CARBON DISULPHIDE. Imperial Chemical Industries, Ltd. Nov. 9. 31697.

STORAGE, TRANSPORT, OR UTILISATION OF CONCENTRATED ACIDS. Imperial Chemical Industries, Ltd. Nov. 9. 31698.

MANUFACTURE OF DYES, ETC. Imperial Chemical Industries, Ltd., and R. F. Thomson. Nov. 9. 31699.

STABILISATION OF BLASTING EXPLOSIVES. Imperial Chemical Industries, Ltd. Nov. 12. (Feb. 15.) 32045.

CENTRIFUGAL CLASSIFYING APPARATUS. International Precipitation Co., and M. A. Lissman. Nov. 10. 31843.

MANUFACTURE OF VULCANISED RUBBER. F. A. Jones. Nov. 10. 31745.

PREPARATION OF GASEOUS MIXTURES. H. Knudsen. Nov. 8. 31549.

CENTRIFUGAL SEPARATORS. A. E. O'Dell and L. Rinuy. Nov. 11. 31971.

PRODUCTION OF CAST METAL BLOCKS. J. E. Pollak (*Vereinigte Aluminium-Werke Akt.-Ges.*) Nov. 9. 31661.

APPARATUS FOR CARRYING OUT GAS REACTIONS. Ruhrchemie Akt.-Ges. Nov. 10. (Germany, Nov. 11, '31.) 31857.

MANUFACTURE OF INTERMEDIATE PRODUCTS AND DYESTUFFS. Soc. of Chemical Industry in Basle. Nov. 11. (Switzerland, Nov. 21, '31.) 31935.

MANUFACTURE OF INTERMEDIATE PRODUCTS AND DYESTUFFS. Soc. of Chemical Industry in Basle. Nov. 11. (Switzerland, Nov. 28, '31.) 31936.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE London chemical market continues to receive a fair general average of inquiries, and the volume of business booked is on the whole satisfactory. There is no change to report in the coal tar products market. Generally steady price conditions have characterised the Manchester chemical market during the past week and changes of any consequence have been few and far between. A somewhat more cheerful undertone has been in evidence and there is a disposition to look for a gradual revival of business although prospects of any material improvement before the turn of the year are rather remote. Deliveries of chemicals into consumption against contract commitments are fairly satisfactory, but the bulk of new business, which is on a moderate scale, continues to be confined to relatively near delivery dates. Business is still steady in the Scottish heavy chemical market and tenders are now being sent out for contracts for next year. Prices of all chemical products remain the same as last week except in the following cases.

General Chemicals

ACID, OXALIC.—LONDON: £48 5s. to £48 15s. per ton in casks. £52 to £56 in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £49 ex store.

ACID, TARTARIC.—10d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb. according to quality.

ARSENIC.—LONDON: £22 10s. c.o.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £25 at mines.

CADMIUM SULPHIDE.—3s. 1d. to 3s. 5d. per lb.

CARBON BLACK.—3¾d. to 5¼d. per lb., ex wharf.

PHENOL.—6½d. to 7d. per lb. for the usual bulk packages.

POTASH, CAUSTIC.—LONDON: £42; MANCHESTER: £40.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8¾d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey, £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £8 10s.; grey, £11 5s.

ACETIC ACID, TECHNICAL, 40%.—£6 10s. to £18 per ton.

WOOD NAPTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The price for export has advanced sharply to £5 5s. per ton f.o.b. U.K. port, in single bags for November shipment. The home price at present remains unchanged at £5 5s. per ton delivered in 6-ton lots to farmer's nearest station.

From Week to Week

THE WINDING-UP PETITION of the Non-Inflammable Film Co., Ltd., has been allowed to stand over until December 19.

MR. F. A. PERKINS has been appointed chairman of Lawes' Chemical Manure Co., Ltd., in place of Mr. E. G. Cubitt, who has resigned owing to ill-health.

THE NORSK HYDRO COMPANY is to erect a soda ash factory in Heron, Norway. It will have a capacity of 18,000 tons of soda ash, and will later also make caustic soda.

MR. J. G. LUNT, assistant analyst to the Leicester City Health Department, has been appointed senior analyst to the Manchester Co-operative Society.

THE IMPERIAL COUNCIL FOR AGRICULTURAL RESEARCH, New Delhi, has made a substantial grant for the study of manures and manuring in India. This grant synchronises with the return to India of an Indian Research Scholar from America, who has specialised in the study of artificial manure manufacture.

SIR CHARLES SCOTT SHERRINGTON, Hon. Fellow of Gonville and Caius Colleges, Cambridge, Waynflite Professor of Physiology and Fellow of Magdalene College, Oxford, who won part of the Nobel Prize for Medicine this year, has been appointed Rede Lecturer for 1933, by the Vice-Chancellor of Cambridge.

A PLATINUM NUGGET weighing over 13 lb. has been found in the Ishevsk Mine, in the Ural Mountains. It is said to be the largest platinum nugget in the world. During the hundred years the Ural platinum mines have been worked large nuggets have been found only three times.

TO ENSURE that the mineral resources of the country should be considered as national reserves, the Mexican Government has passed a Presidential Decree nationalising the deposits of gold, copper, antimony, mercury, aluminium, phosphates, nitrates, coal, platinum, iron and bismuth. It is understood that the existing grants to foreigners in respect of mining on oil-bearing lands will be respected.

THE MANCHESTER SECTION of the Oil and Colour Chemists' Association will hold its eighth annual dinner and carnival dance at "The Manchester," Ltd., Royal Exchange, Manchester, on November 26, at 7.0 p.m. The price of tickets for either members or their guests will be 7s. 6d. each, exclusive of wines, and applications for tickets should be made to the hon. secretary, 12 Broadway Avenue, Cheadle, Cheshire.

THE FIFTEENTH ANNUAL GENERAL MEETING of the British Association of Chemists will be held at the Midland Hotel, New Street, Birmingham, on November 26. The 15th annual dinner dance of the association will be held on the same day at 7 p.m. Tickets, which are 10s. 6d. (exclusive of wine), may be obtained from the general secretary, British Association of Chemists, "Empire House," 175 Piccadilly, London, W.1.

MR. CLIFFORD ROBERTS, of Beckwith Knowle, Harrogate, aniline dyeware merchant, left £85,704 (net personalty £75,615).

A FIRE BROKE OUT on Sunday in the by-product plant of the Bignall Hill Colliery Company, Ltd., near Stoke-on-Trent. The tar plant was destroyed, but the benzol plant was saved.

MR. WILLIAM REAVELL, managing director of Reavell and Co., Ltd., Ipswich, has been unanimously re-elected president of the British Engineers' Association.

THE ADDRESS of the Trussed Concrete Steel Co., Ltd., whose "Hy-Rib" concrete reinforcement was described in an article in THE CHEMICAL AGE of November 5 (p. 436) is 22 Cranley Gardens, South Kensington, London, S.W.7.

THE JUBILEE MEMORIAL LECTURE, "Alcohol Through the Ages," by Dr. E. F. Armstrong, F.R.S., will be given at a meeting of the Yorkshire Section of the Society of Chemical Industry in the Chemistry Lecture Theatre, at the University of Leeds, on December 12, at 7.15 p.m.

LORD GREENWOOD has been elected chairman of Lewis Berger and Sons, Ltd., paint, varnish and enamel manufacturers, in succession to Sir Herbert Hambling, who died last January. Lord Greenwood, a former Chief Secretary for Ireland, is chairman of the Aerated Bread Co., Ltd.

THE COUNCIL of the University of Manchester has accepted the resignations of the following members of the Faculty of Technology: Mr. L. G. Radcliffe, Lecturer in Organic Chemistry, who has been a member of the University staff since 1908, and of the staff of the College of Technology for 40 years; and Dr. B. A. Bannister, Demonstrator in Chemical Technology.

THE FILM of the British Wood Preserving Association will be shown to members of the Timber Trade Federation at 2.30 p.m., on November 23, at Film House, 140 Wardour Street, London, W.1. The film has recently received some additions, and is being shown now in a form suitable for exhibition early in the new year at the Tatler Theatre.

THE SALZWERK FUR CHEM. FABRICATE, with its head office at Sofia, Bulgaria, is considering in addition to the existing factory at Mirowo, the construction, near Varna, of a chemical plant for the manufacture of carbonate of soda, sodium bicarbonate, and caustic soda, with a proposed daily capacity of 16 metric tons of carbonate of soda and 8 metric tons of caustic soda.

VAN PERLSTEIN AND MUNRO, yeast manufacturers, Chieftain Works, Putney, are equipping a new factory at Ipswich for the extension of their manufacturing process. Certain raw material, previously imported, will be obtained from the new works, where complete modern plant is now being laid down. This development follows the difficulties occasioned by the depreciation of sterling, and the result will be employment for over 200 workpeople.

LORD MELCHETT, in an article entitled "John Bull Grows Polite," says that the days have gone when the world had to buy British goods because there were none others. Now we have to persuade the world to buy, and a recognition of this fact is the British Industries Fair next February. At last British manufacturers are studying the needs of their customers and are realising that goods will not sell just because they are British made. British manufacturers are determined to please all, and are making the Fair a record one for the extent of its exhibits.

REPRESENTATIVES of the British gas industry will visit Canada and the United States next September. The party will visit Quebec, Montreal, Ottawa (where they will attend the Canadian Gas Convention), Toronto, Niagara Falls, Detroit and Chicago. At Chicago they will visit the American Gas Association's Convention and tour the Chicago Centennial Exhibition, where they hope to gain useful information with regard to the development of gas for industrial purposes. From Chicago they will proceed to a number of other cities in the United States.

A CONFERENCE on "The Swelling of Proteins and Allied Phenomena" will be held under the auspices of the British Section of the International Society of Leather Trades Chemists at the Leathersellers' Hall, St. Helen's Place, Bishopsgate, London, E.C.3, on December 1, when Professor F. G. Donnan, F.R.S., will give an introductory address. All chemists and others interested in the physical chemistry of proteins and its practical applications are invited to attend. Those intending to be present should notify Dr. C. H. Spiers, Leathersellers' Technical College, Tower Bridge Road, London, S.E.1, who will supply advance proofs of papers to be read, and give all necessary information.

A CONTRACT of £250,000 was recently awarded to the International Combustion, Ltd., for four large powdered-coal fired boilers for the new Swansea power station. The new boilers will burn anthracite duff coal, which being of particularly low grade, is usually thrown on dumps. Until now there has only been a restricted market for duff, but this contract opens up good prospects to the Welsh anthracite producers. It is estimated that the maximum load the station can consume will be 50 tons of anthracite duff per hour, and that this project has been made possible through the progress made in pulverised coal fired boiler design, during the last few years.

SYNTHETIC SODIUM NITRATE PRODUCTION in Germany may exceed 200,000 tons this year, almost 150,000 tons having been exported, mainly to France, in the first six months of 1932. This is a record and can be compared with an output of 180,000 tons or less in 1931 and an average of 60,000 to 70,000 tons in immediately preceding years. The I.G. Farbenindustrie now dominates German production of synthetic sodium nitrate, depending on the Solvay works, headquarters at Bernburg in Anhalt, for the soda ash entering the interaction. It is understood that the I. G. is producing, mainly for French order, in its plants at Oppau, Hoechst, and Bitterfeld.

PROFESSOR GEORGE KNOX, of Cardiff University, in an address on "The Future Uses of Coal" to members of the Cardiff Rotary Club recently, explained a scheme by which coal hydrogenation plants could be erected at a cost of £7,500,000 each in all the British coalfields for the production of oil supplies. Attached to each hydrogenation unit chemical works could be established for the ultimate production of fertilisers, disinfectants, soaps, perfumes, explosives, etc. The carbonisation plants would provide smokeless fuel. The estimated cost would be £10,400,000. The yield in oil and smokeless fuel would be 239,000 tons and 2,600,000 tons respectively, and the amount of coal consumed 4,410,000 tons a year. Ten such plants erected throughout the British coalfields would produce a large proportion of our oil fuel supplies, using our own coal and labour, and at the same time ensuring the safety of supplies for the Navy, mercantile marine, and transport services in the event of war. The total cost would be less than what the State was said to have expended to secure foreign oil supplies.

SOUTH AFRICAN INDUSTRIALISTS have been investigating the possibilities for utilising various sorts of waste materials, and a new £30,000 factory is to be built at Cape Town Docks to convert waste fish into fish-meal, largely for export. It is hoped that the factory will be ready by the end of the present year. It will only deal with fish-meal as a food product, and will not manufacture fertiliser. So far no Cape factory has been able to do more than produce meal for local needs, and until the special machinery of this factory has been imported mnufacture on a large scale will not be possible. The fish-meal made in the new factory will be exported as a highly concentrated animal foods and may also be used in connection with the manufacture of animal foods such as dog biscuits. At first the factory may consume 100 tons of fish a week, but it is anticipated that this average will soon increase to 200 tons a week. Considerable use will be made of the non-edible sharks and skate (which at present are jettisoned by the trawlers) and fresh fish offal. The material passing through the factory will be completely sterilised by a special chemical process, which has been designed to prevent offensive odours passing into the atmosphere.

AN INSTANCE of the keenness of the Danes to do business with Great Britain, is given by the fact that recently some 76 Danish bacon factories belonging to the United Danish Co-operative Butchers' Association signed a contract with the Imperial Chemical Industries, Ltd., to purchase from them all ther supplies of ammonia for 1933. In view of the closeness of Denmark to other great chemical manufacturing countries, such as Germany, this insistence on "buying British" is particularly noteworthy.

IT IS ANNOUNCED that Dorman, Long and Co., Ltd., have entered into an agreement with Krupps, of Essen, whereby the former company secures a licence to operate certain technical processes. The agreement provides for an interchange of experience between the two concerns in connection with the rolling of sections of advanced design. The agreement, in particular, covers the manufacture under licence of certain special sections, which hitherto have been manufactured exclusively by Krupps.

MR. J. DAVIDSON PRATT, of the Association of British Chemical Manufacturers, and Mr. W. J. U. Woolcock, of Imperial Chemical Industries, Ltd., will continue to represent the chemicals section, and Mr. A. T. Cussons, of Cussons, Sons and Co., Ltd., Kersal Vale Works, Manchester, the druggists' sundries section, on the reconstituted exhibitors' advisory committee for the London section of the British Industries Fair which has now been completed by the election of thirty members from those trade sections of the Fair in which there are upwards of twenty-five exhibitors.

THE HIGHEST American engineering honour, the John Fitz Gold Medal, has been awarded to Daniel Cowan Jackling, of San Francisco, for his work in extracting copper on a large scale from ore containing as little as 2 per cent. of the metal. Mr. Jackson is president or director of a large number of mining companies, and in 1917 was appointed U.S. Director of Explosives. It is probable that at least half of the present day production of copper is from low grade ore, in the development of which Mr. Jackling, it is claimed, was the pioneer.

A FURTHER APPLICATION OF SLUDGE GAS for industrial power is contemplated in the Midlands. It is a form of economy which has been developed with great success at the sewage disposal works of the Birmingham Tame and Rea District Drainage Board, and authority is now being sought for its adaptation to the system of sewage disposal in use at Tipton, in the Black Country. According to the results of tests which have been laid before the Ministry of Health by the local authority a gas of a calorific value of 700 B.Th.U. per thousand cubic feet, compared with 500 units in the case of ordinary town gas, can be collected from the sludge in sufficient quantities to operate all the gas engines at the sewage disposal works. The cost of the scheme is estimated at £5,170. Against this £500 a year will, it is expected, be saved in power cost.

IN A LETTER TO "The Times" on November 7, Sir Ernest Benn, whose views on public economy and liberal private expenditure are well-known, suggested that the theorists and the thrifty diehards should be persuaded to agree to a six weeks' Christmas truce, to suspend their quarrels over abstruse fundamentals and to let the public for the first time since 1913 give itself whole-heartedly to Christmas delights. In advocating Christmas spending on the old scale, Sir Ernest wrote: "The volume of trade involved in the proposal is not large—it amounts perhaps to a few shillings per head of the population—but there is that much more psychological mystery which is called confidence, and a six weeks' effort which would put a little hope behind our retail counters might be more effective in promoting confidence than the actual figures would indicate."

A PAPER on the use of rubber in the printing industry was presented by Dr. G. L. Riddell at a meeting of the London and District Section of the Institution of the Rubber Industry on November 14. Dr. Riddell discussed the difficulties experienced in letterpress work owing to the deleterious effect of oil printing inks on rubber. He said the chief disadvantage of rubber rollers in newspaper printing was the swelling of the rollers as the result of the action of the mineral oil in the inks used. Research carried out in America by the Lithographic Technical Foundation had shown that the swelling of rubber blankets was due to the absorption of linseed oil from the inks. Petrol as a washing material considerably lengthened the life of a lithographic off-set blanket, however. Dr. Riddell also suggested examining the possibility of using rubber latex as a gravure ink medium.

Obituary

MR. ALEXANDER T. NAIRN, for 47 years on the staff of Charles Tennant and Co., Carnoustie, at Gannochy, Victoria Street, Carnoustie, on November 8.

SIR DUGALD CLERK, F.R.S., on November 12 at his home at Ewhurst, in his seventy-ninth year. Sir Dugald was well-known for his researches on internal combustion engines and on the possibilities of gaseous fuel for gas lighting and heating; and also on the specific heat and explosive pressures of gases which led to his election to the fellowship of the Royal Society in 1908.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Brazil.—A commission agent established at Porto Alegre wishes to obtain the representation of United Kingdom manufacturers of cement, zinc sheets, sulphate of copper, etc. (Ref. No. 689.)

British India.—The British Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders (Tender No. M. 2195), to be presented in New Delhi by December 5 for the supply of liquid chlorine, alumino ferric and sulphate of alumina. (Ref. F.X. 1634.)

Argentina, Uruguay, Brazil, Chile, Peru and Cuba.—A commercial traveller about to undertake a business tour of these countries on behalf of a well-known United Kingdom firm manufacturing an engineering speciality, is, with the consent of his principals, prepared to carry the lines of two or three United Kingdom manufacturers of allied and non-competitive engineering supplies, and of paints and compositions for iron and steel work, who might be prepared to share the expenses of the trip, which is estimated to occupy about seven months. (Ref. No. 688.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BOAKE (A.), ROBERTS AND CO., LTD., London, E., chemical manufacturers. (M., 19/11/32.) Registered November 7, £33,500 debs., part of £100,000; general charge. *£50,500. June 22, 1931.

CEMENT INDUSTRIES, LTD., London, S.W. (M., 19/11/32.) Registered Nov. 4. £1,900 debs., part of amount already reg.; general charge.

RILEY (JOHN) & SONS, LTD., Hapton, chemical manufacturers. (M., 19/11/32.) Registered Oct. 29, £10,000 debs.; general charge. *£4,700. December 31, 1931.

Satisfaction

RILEY (JOHN) & SONS, LTD., Hapton, chemical manufacturers. (M.S., 19/11/32.) Satisfaction registered October 29, of debentures registered October 14, 1912.

London Gazette, &c.

Company Winding Up

RAYON MANUFACTURING CO. (1927), LTD. (C.W.U. 19/11/32.) Winding-up order, November 7.

Partnership Dissolved

JOHN LOVERING & CO. (John Lovering, William Thomas Lovering, Frederick Richard Lovering, Howard Mountstephen Lovering, John Stephens Lovering, Cecil Downing Lovering, Edith Beatrice Lovering, the Public Trustee (as Trustee for Dorothy Margaret Beatrice Bowden-Bomyer), John Martin, Thomas Martin, William Hedley Martin and Stanley Martin), china clay producers, St. Austell, by mutual consent, August 19, 1932.

Company News

Nitrate Producers' Steamship Co.—An interim dividend is announced of 2s. 6d. per share net.

Guest, Keen and Nettlefolds, Ltd.—The directors have declared an interim dividend at the rate of 5 per cent. per annum on the first preference shares, free of tax, to be paid on December 19.

Langdale's Chemical Manure Co.—The profit for the year ended September 30 last was £990 (against £1,159), which, deducted from the debit brought forward of £1,278 leaves a net debit to be carried forward of £288.

Arnold I. Van den Bergh.—For the year to August 31 last the profit was Fl.16,163 (against Fl.36,314). The dividend on the preference shares takes Fl.863, leaving Fl.15,300, which with the amount brought in allows Fl.30,190 to be carried forward.

British Cyanides Co., Ltd.—The net profit for the year to June 30 last was £9,321 (against £2,928), to which is added the balance brought forward of £1,945, making £11,266, from which has to be deducted dividend on preference shares, together with Rock Investment Co.'s percentage thereon, amounting in all to £1,512, leaving a balance of £9,754. It is proposed to place £5,498 to reserve, and, after providing for dividend on the preference shares for the half-year to June 30 last, and percentage payable thereon amounting to £756, that the balance of £3,500 be carried forward. It is proposed to pay, on February 15 next, an interim dividend at the rate of 3 per cent., less tax, on the ordinary shares out of the profits already earned during the current financial year. The annual meeting will be held at Southern House, London, on November 16, at 12 noon.

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